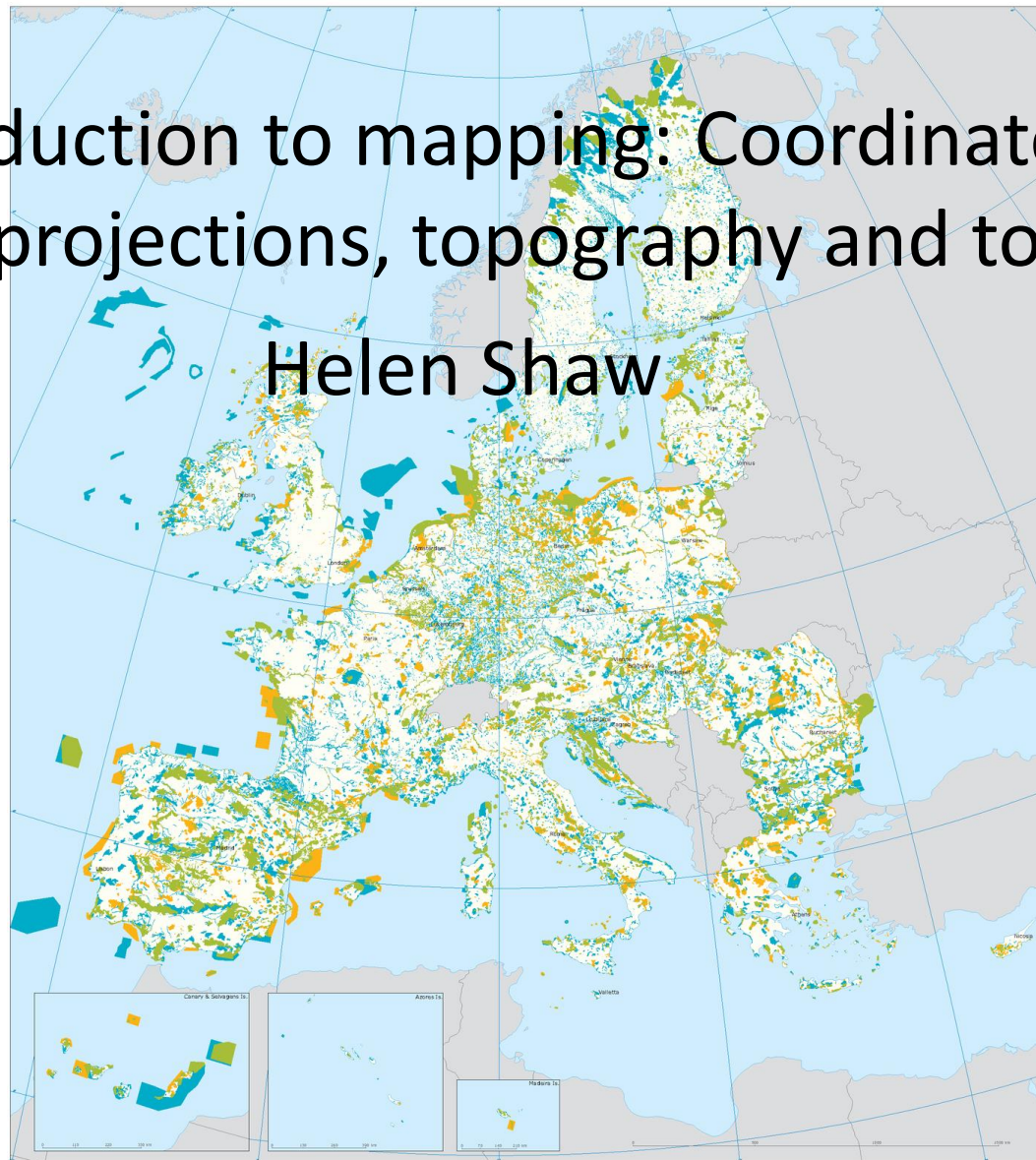


An introduction to mapping: Coordinate systems, map projections, topography and topology

Helen Shaw



NATURA 2000 - EUROPEAN UNION

- Orange Birds Directive sites (SPA)
- Blue Habitats Directive sites (pSCI, SCI, SAC)
- Green Sites - or parts of sites - belonging to both Directives

European Environment Agency



SOURCE:
- NATURA 2000 - DGE ENV, compiled from databases from the Member States.
- Sources: Biological Data, © European Environment Agency and DGE ENV.
- Vectors of NATURA 2000 data for a Europe, updated 2015.
- Projection: Lambert Azimuthal Equal Area.

By the end of today's session you will be able to explain:

- Map reading (British National Grid map references)
 - What is G.I.S?
 - What does it do/how is it built?
 - Datasets for spatial planning online
-
- After the lecture you should
 - Read about map projections and consolidate learning on map reading
 - Look at sources of GIS data online

GIS Geographical Information System

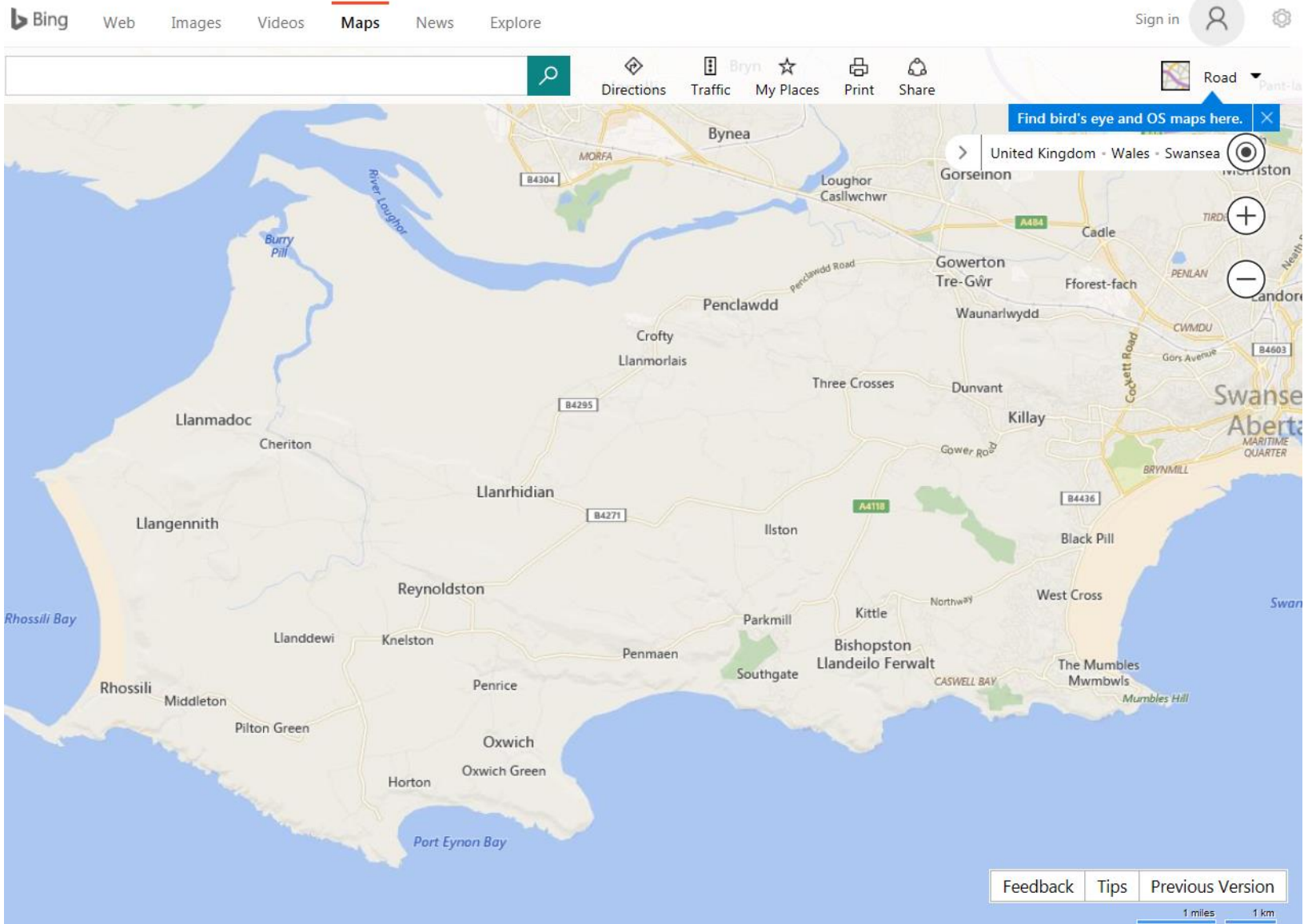
What does this mean?

Write an explanation down!

How would you describe GIS

What is different between a GIS and a Map?

A simple map



An aerial photo

Bing

Web

Images

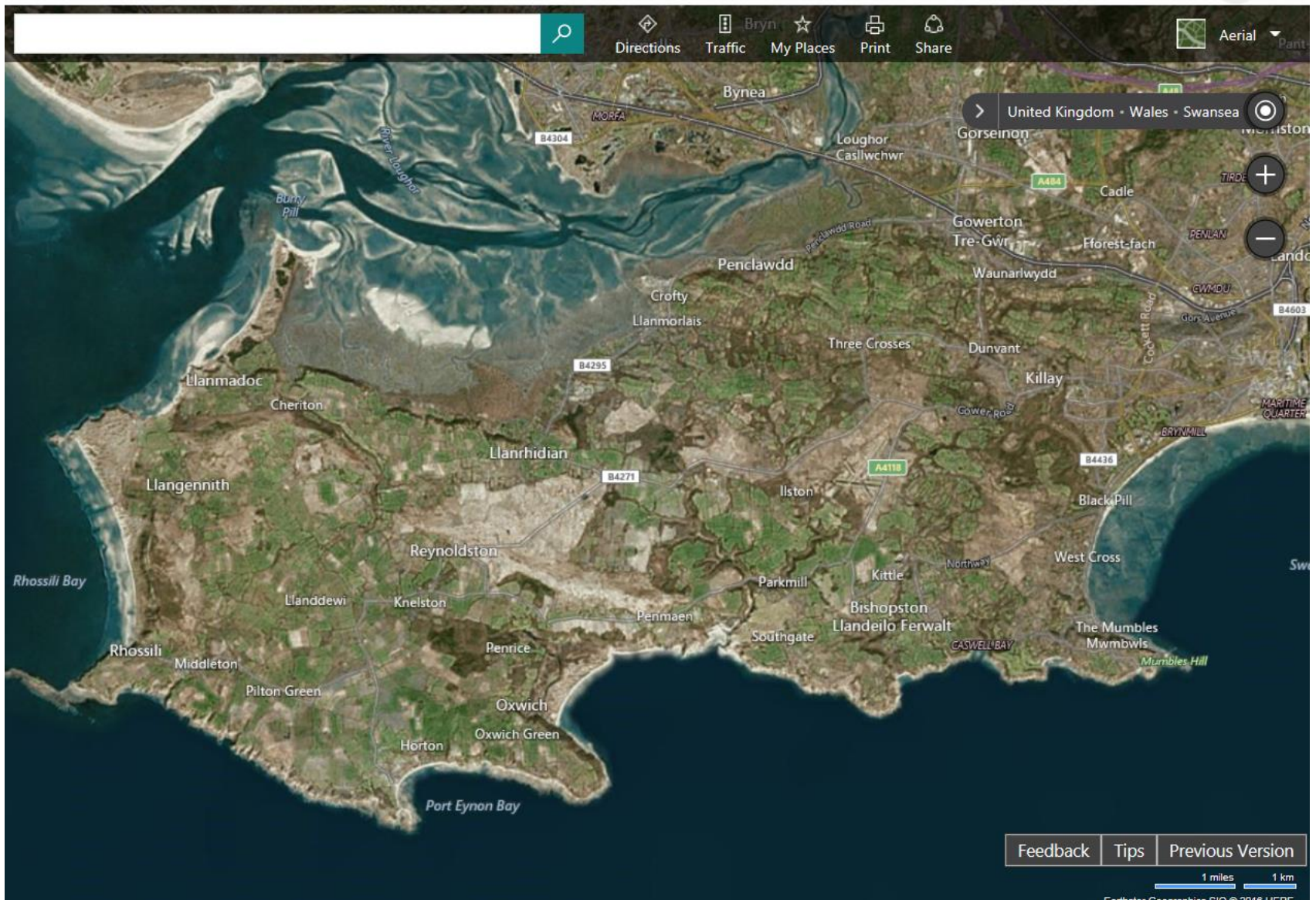
Videos

Maps

News

Explore

Sign in



Up to date information

Bing Web Images Videos **Maps** News Explore

Sign in  

Search  Directions Traffic My Places Print Share Aerial 

Traffic 

Traffic legend

	Heavy		Light
	Moderate		No traffic

 **Cameras**
Zoom in to see more cameras

United Kingdom - Wales - Swansea

Map showing traffic conditions around Swansea, Wales. The map displays various roads and locations, including Llanelli, Bryn, Bynea, Loughor, Gorseinon, Cadle, Llangyfelach, Morriston, Llanelli, Llanmorlais, Penclawdd, Crofty, Llanmadoc, Cheriton, Llangennith, Llanrhidian, Reynoldston, Llanddewi, Knelston, Penrice, Penmaen, Parkmill, Kittle, Bishopston, Llandeilo Ferwalt, Southgate, West Cross, Black Pill, The Mumbles, Mumbles Hill, and Swansea Bay. Traffic conditions are indicated by colored lines: red for heavy, orange for moderate, yellow for light, and green for no traffic. A legend on the left explains these colors. A 'Cameras' toggle is also present. The map includes a search bar, navigation controls, and a scale bar at the bottom right.

Feedback Tips Previous Version

1 miles 1 km

Earthstar Geographics SIO © 2016 HERE

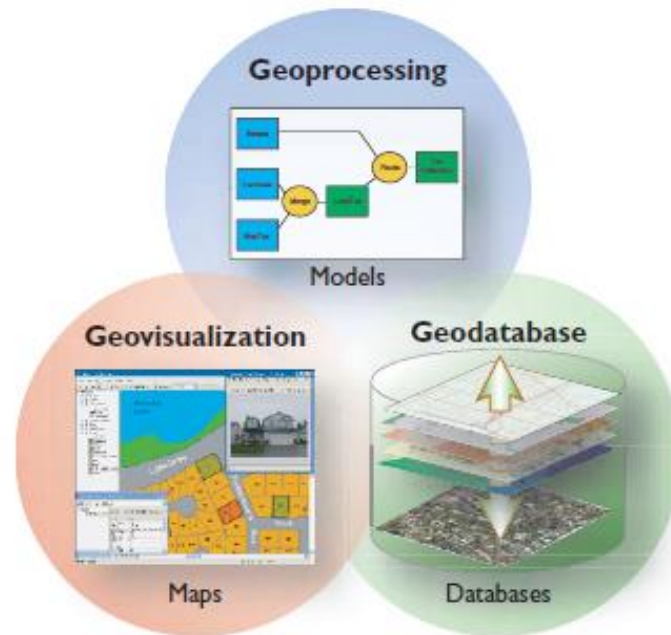
GIS Maps visualise spatial information

They represent, graphically, the contents of a database onto a spatial map.

A Geodatabase

What is G.I.S?

“A geographic information system is a system of the management, analysis and display of geographic information. Geographic information is represented by a series of geographic datasets that model geography using simple generic data structures. GIS includes a set of comprehensive tools for working with the geographic data.”



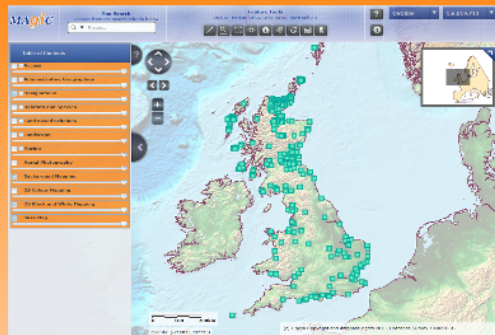
The three views of GIS

Where have you seen GIS used before?

Create a list of useful sources of GIS data

Share via Journal Club

- Build a student resource



Interactive mapping at your fingertips

[Get Started](#)

What is MAGIC?

The MAGIC website provides authoritative geographic information about the natural environment from across government. The information covers rural, urban, coastal and marine environments across Great Britain. It is presented in an interactive map which can be explored using various mapping tools that are included. Natural England manages the service under the direction of a Steering Group who represent the [MAGIC partnership organisations](#).

Latest News

Following comments received in the 2015 MAGIC user survey – a new tool  has been added above the interactive map to allow you to view a legend just of the datasets you have selected and which are visible at your chosen scale. The legend window can be moved around the screen by clicking on the black banner at the top of the [Continued >>](#)

Contact Details

For support: support.magic@defra.gsi.gov.uk
 To provide feedback: feedback.magic@defra.gsi.gov.uk
 To Speak to Natural England Enquiries: Telephone 0300 060 3900
 **MAGIC Service Manager**
 Natural England
 3rd Floor
 Lateral House
 8 City Walk
 Leeds
 LS11 9AT

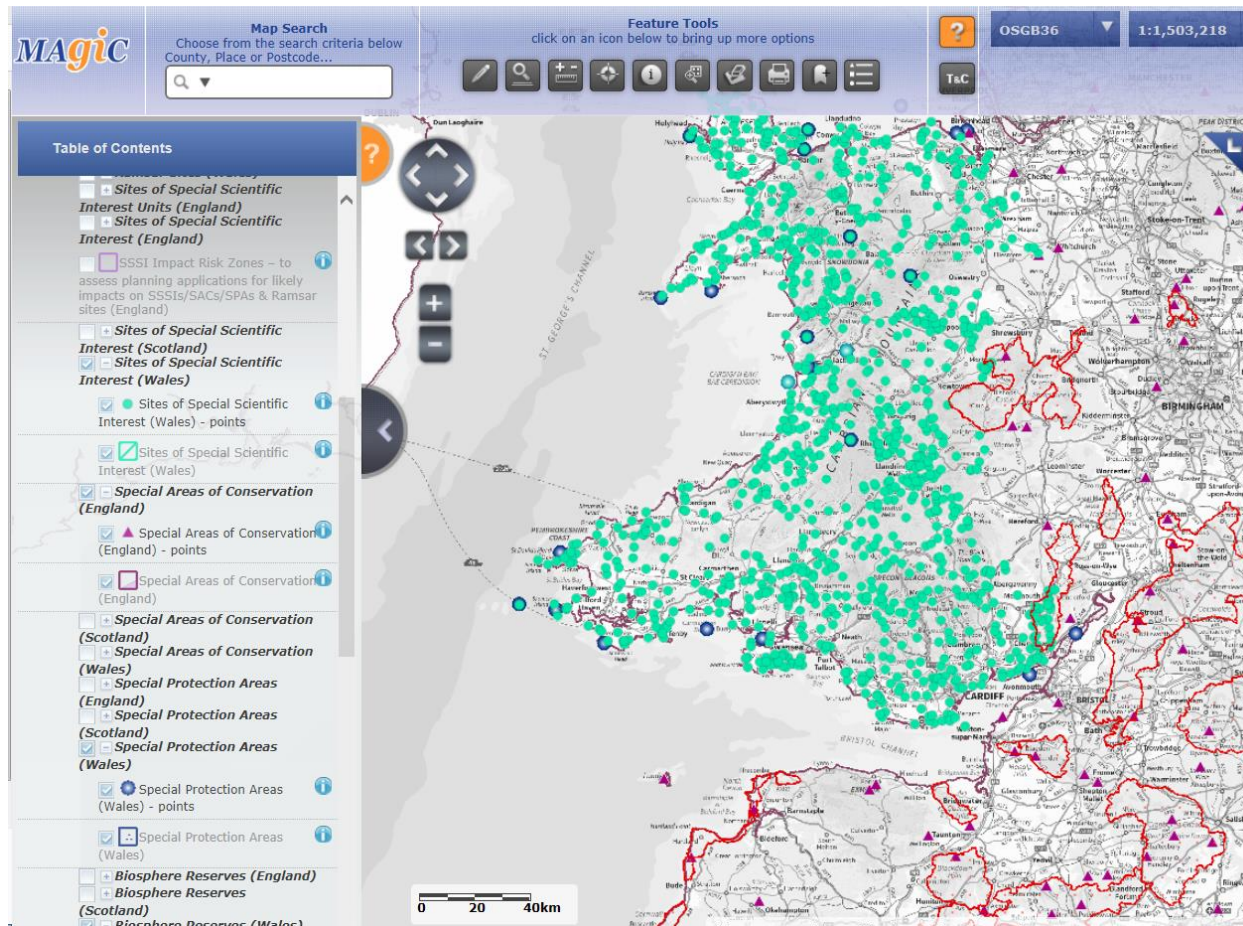
Terms of Use

By using this site you accept to be bound by the [MAGIC website Terms and Conditions](#) covering the Intellectual Property Disclaimer, General Disclaimer, Cookies and Privacy Policy

Help

[FAQ](#)
[Help Library](#)
[Working with Maps](#)

An example of an online GIS

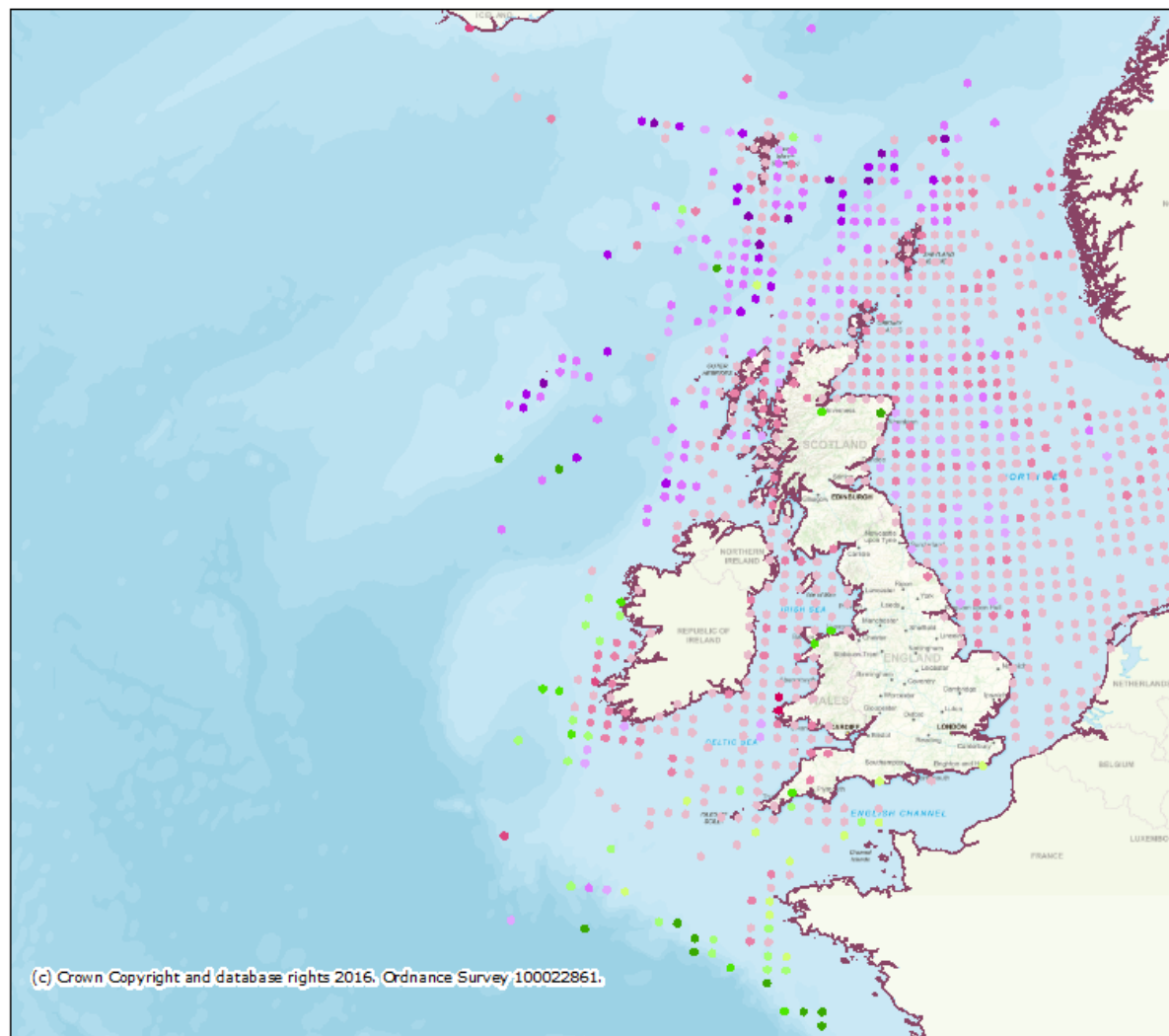


<http://magic.defra.gov.uk/>

MAGIC is a site managed by defra that provides geographic information on the natural environment of the UK.

The data can be queried to bring up a range of different map outputs.

Dolphin sitings map



Legend

**Atlantic White Sided
Dolphin - Max Sighting
Rate Per Hour (GB)**

- 0.0001 to 0.1
- 0.1 to 1.0
- 1.0 to 3.0
- 3.0 to 13

**Harbour Porpoise - Max
Sighting Rate Per Hour
(GB)**

- 0.0001 to 0.1
- 0.1 to 1.0
- 1.0 to 3.0
- 3.0 to 17
- 17 to 106

Projection = OSGB36

xmin = -2023000

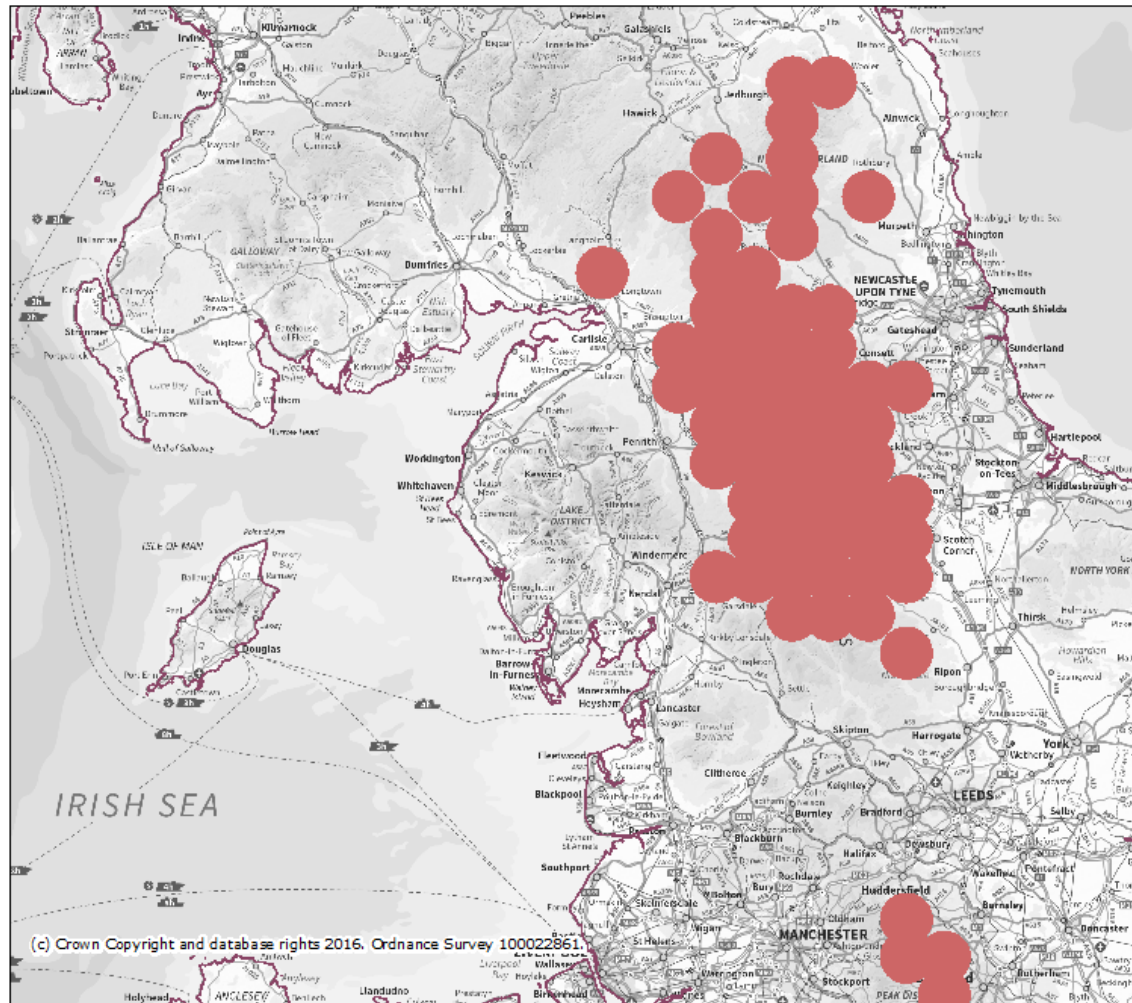
ymin = -797000

xmax = 1630000

ymax = 2003000

Map produced by MAGiC on 10 October, 2016.
Copyright resides with the data suppliers and the map
must not be reproduced without their permission. Some
information in MAGiC is a snapshot of the information
that is being maintained or continually updated by the
originating organisation. Please refer to the metadata for
details as information may be illustrative or representative
rather than definitive at this stage.

Black Grouse in England



Legend

■ Black Grouse (England)

Projection = OSGB36

xmin = 100300

ymin = 338700

xmax = 556900

ymax = 688700

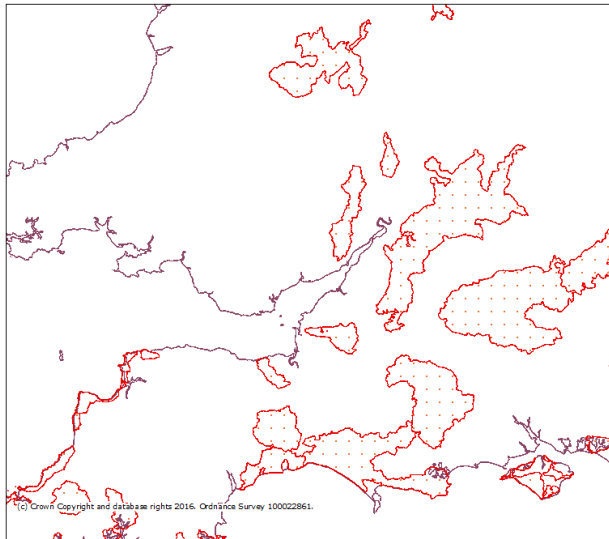
Map produced by MAGiC on 10 October, 2016.

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Can you see a difference in these two types of data? And the maps?

MAGIC

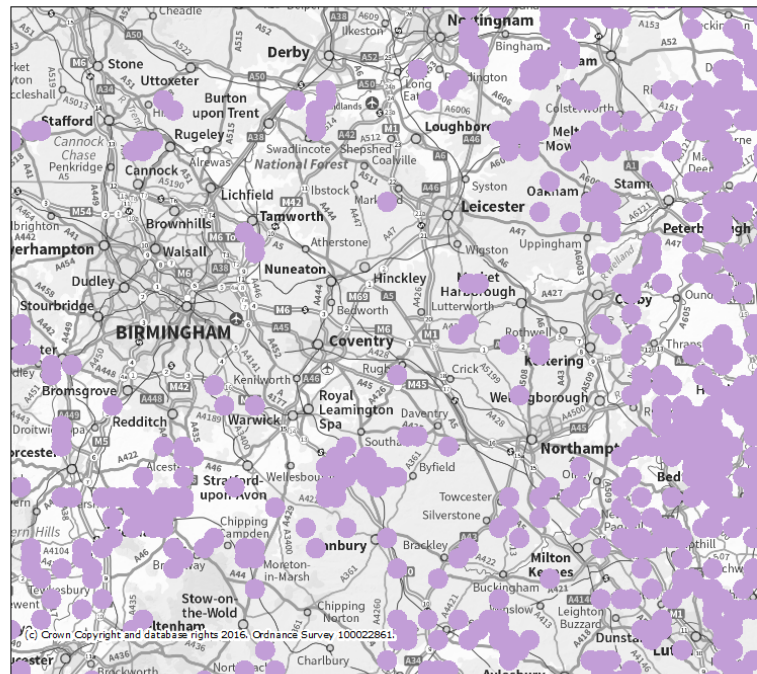
AONB



Legend
□ Areas of Outstanding
Natural Beauty (England)

MAGIC

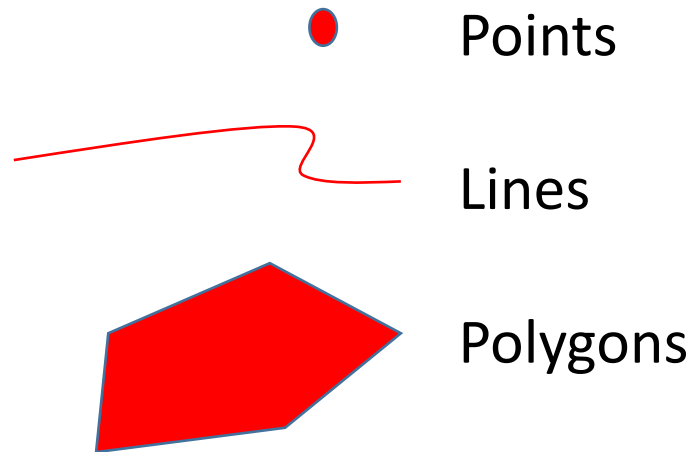
Turtle dove in England



Legend
■ Turtle Dove (England)

Projection = OSGB36
xmin = 333600
ymin = 192100
xmax = 561900
ymax = 367100
Map produced by MAGIC on 10 October 2016.
Copyright resides with the data suppliers and the map
must not be reproduced without their permission. Some
information in MAGIC is a snapshot of the information
that is being maintained or continually updated by the
originating organisation. Please refer to the metadata for
details as information may be illustrative or representative
rather than definitive at this stage.

Data display in GIS

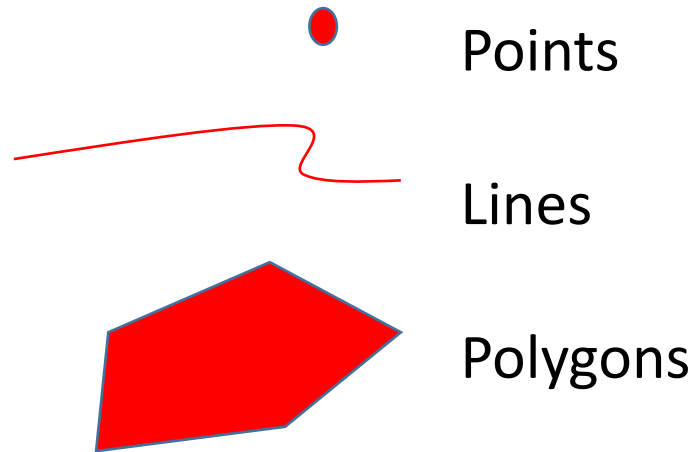


Think of uses for these different data types

Points are not scaleable – they do not represent an area

Lines are scaleable by length, but width can be exaggerated (otherwise they would be too thin to see!) Think of the width that roads are depicted at on a road map...

Polygons are scaleable – they have an area. As the map scale changes the area enclosed by the polygon will change with the scale of the map



Which methods of display would be useful for Phase 1 Habitat Mapping and for which features of the map?

A point is georeferenced in space

It has one dimension

It is referenced by a map projection

Latitude/Longitude

British National Grid

Etc...

https://youtu.be/FXu0_ocVMVU

<https://www.ordnancesurvey.co.uk/resources/maps-and-geographic-resources/the-national-grid.html>

Using the National Grid

			HO	HP		
			HT	HU		
	HW	HX	HY	HZ		
NA	NB	NC	ND	NE		
NF	NG	NH	NJ	NK		
NL	NM	NN	NO	NP		
	NR	NS	NT	NU		
	NW	NX	NY	NZ	OV	
		SC	SD	SE	TA	
		SH	SJ	SK	TF	TG
	SM	SN	SO	SP	TL	TM
	SR	SS	ST	SU	TQ	TR
SV	SW	SX	SY	SZ	TV	

On OS maps, these squares are further divided into smaller squares by grid lines representing 10 kilometre spacing, each numbered from 0 to 9 from the south-west corner, in an easterly (left to right) and northerly (upwards) direction, as shown below.

	09	19	29	39	49	59	69	79	89	99
9	08	18	28	38	48	58	68	78	88	98
8	07	17	27	37	47	57	67	77	87	97
7	06	16	26	36	46	56	66	76	86	96
6	05	15	25	35	45	55	65	75	85	95
5	04	14	24	34	44	54	64	74	84	94
4	03	13	23	33	43	53	63	73	83	93
3	02	12	22	32	42	52	62	72	82	92
2	01	11	21	31	41	51	61	71	81	91
1	00	10	20	30	40	50	60	70	80	90
0										
	0	1	2	3	4	5	6	7	8	9

Northings (up the stairs) ›

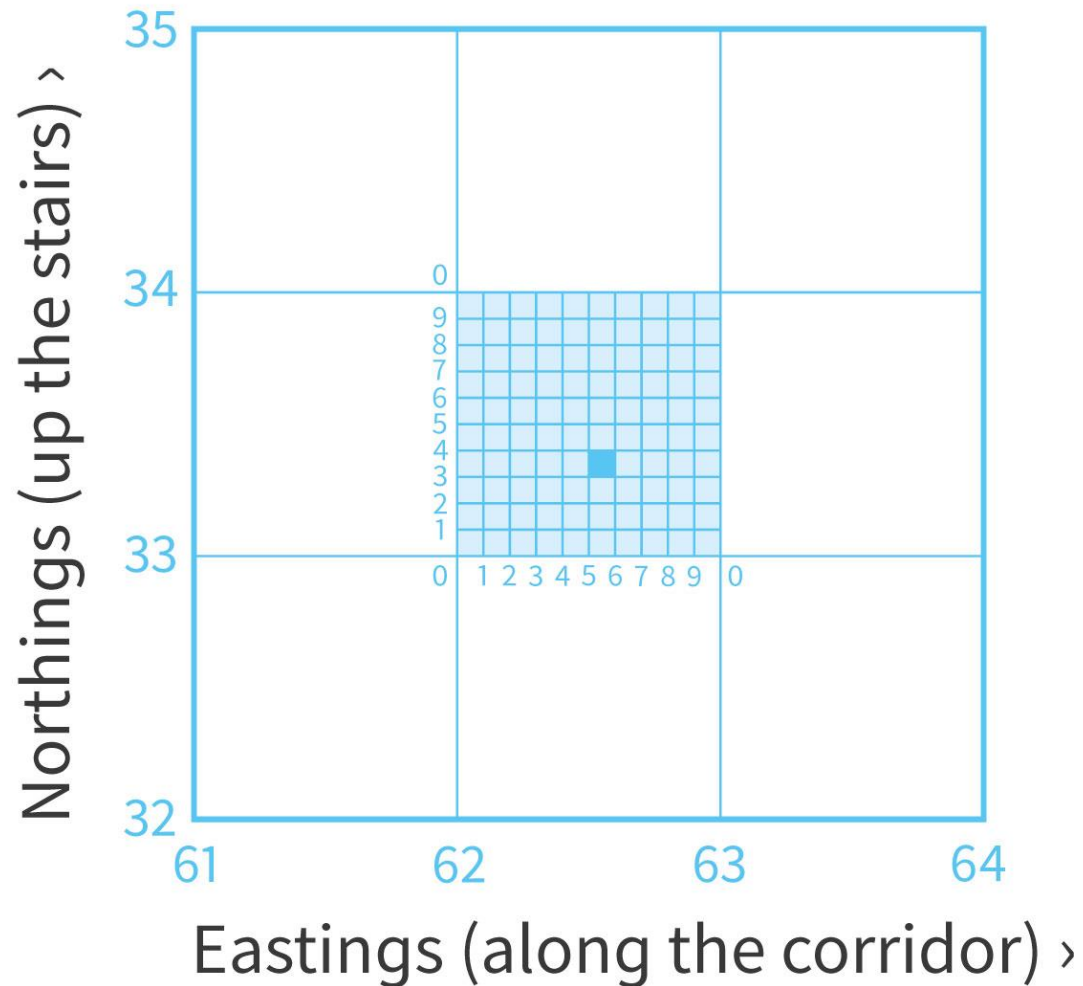
south-west corner

Eastings (along the corridor) ›

<https://www.ordnancesurvey.co.uk/docs/support/guide-to-nationalgrid.pdf>

Further divisions – each time you add a number you increase accuracy by factor of 10

Diagram E



			HO	HP		
			HT	HU		
	HW	HX	HY	HZ		
NA	NB	NC	ND	NE		
NF	NG	NH	NJ	NK		
NL	NM	NN	NO	NP		
	NR	NS	NT	NU		
	NW	NX	NY	NZ	OV	
		SC	SD	SE	TA	
		SH	SJ	SK	TF	TG
	SM	SN	SO	SP	TL	TM
	SR	SS	ST	SU	TQ	TR
SV	SW	SX	SY	SZ	TV	

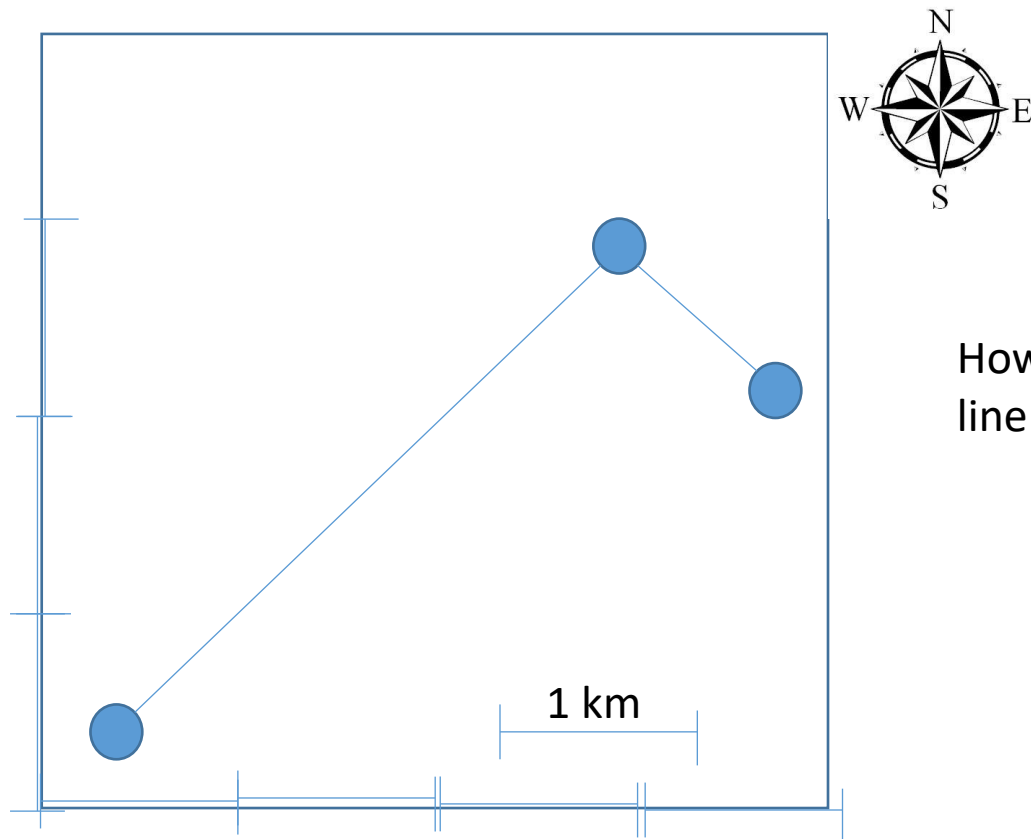
Where is the Gower?
In Square SS

http://www.southwalesmountaineering.org.uk/wiki/Gower_Crag_Grid_References

Examples of Point Data...



A line is also georeferenced but space is 2 dimensional
A line is an extrapolation between a number of points.
Each point or node represents a change of direction
Each line has a distance but not a width

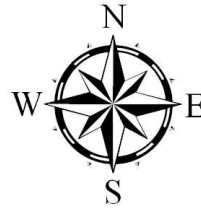
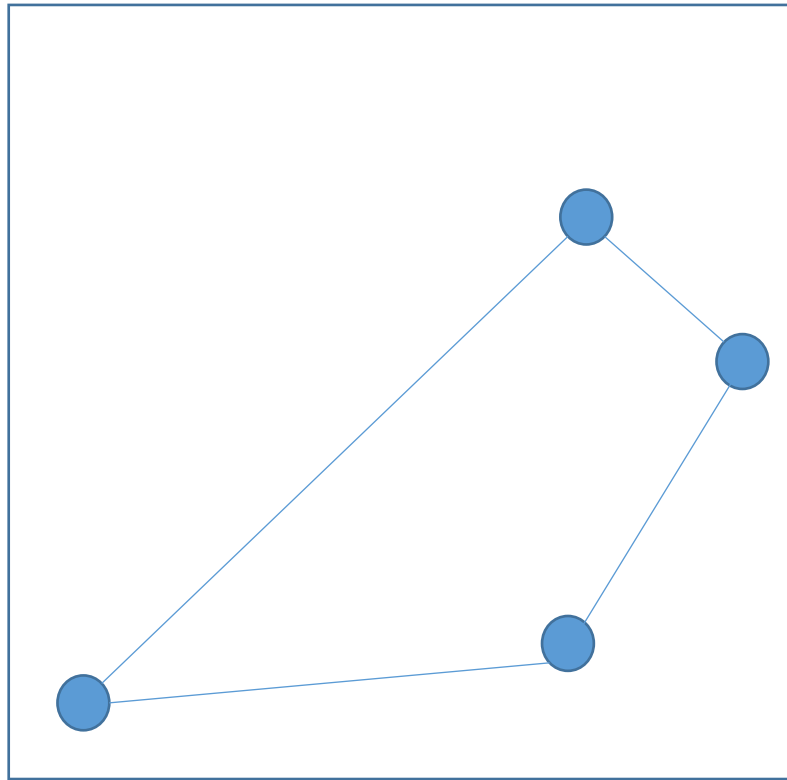


How might you describe this line in space?

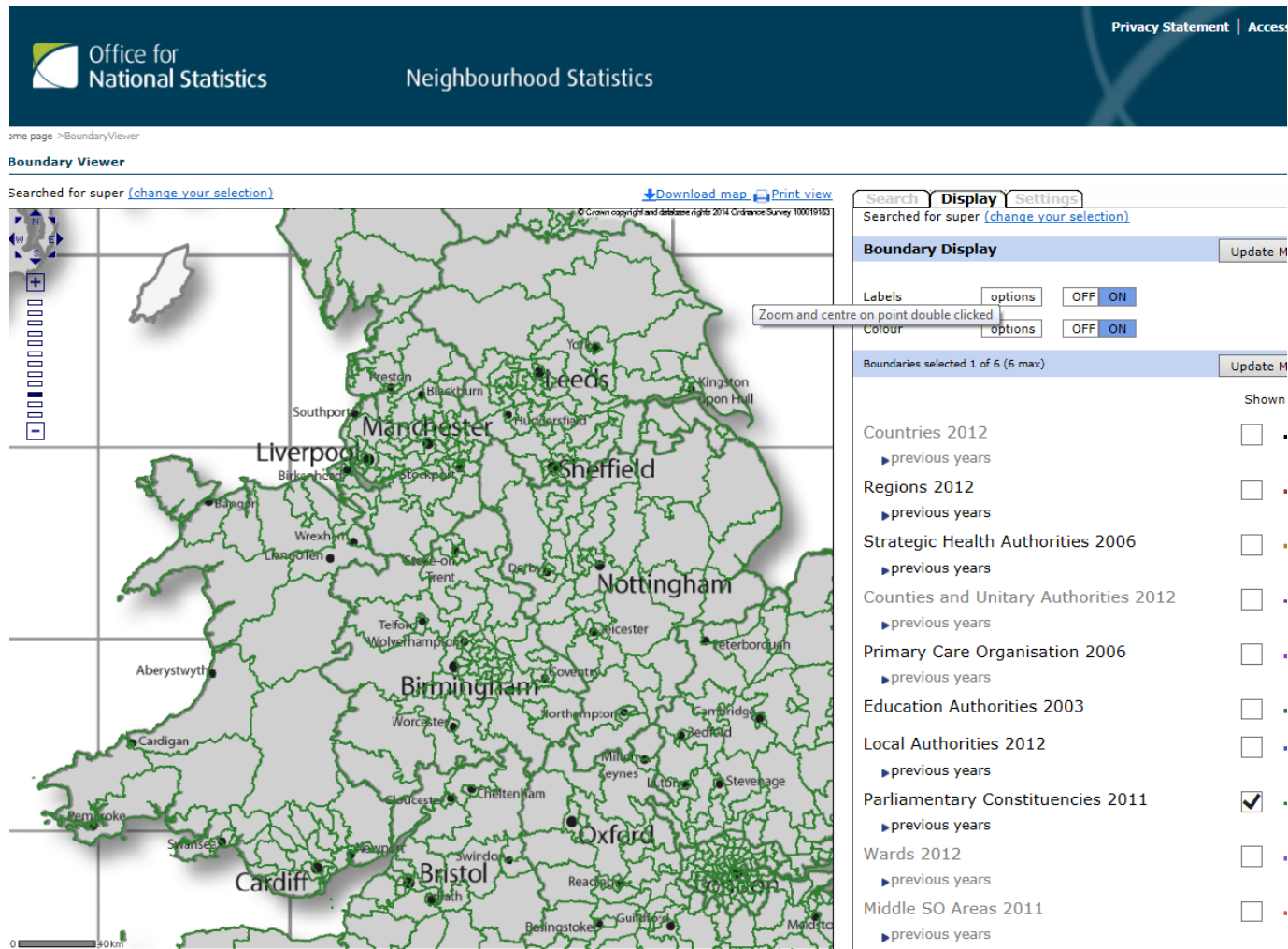
Examples of Line Data...



A polygon is also georeferenced but contains an area
A line is an extrapolation between a number of points.
Each point or node represents a change of direction
Each line has a distance but not a width
Each enclosed shape has an area



Examples of Polygon Data...

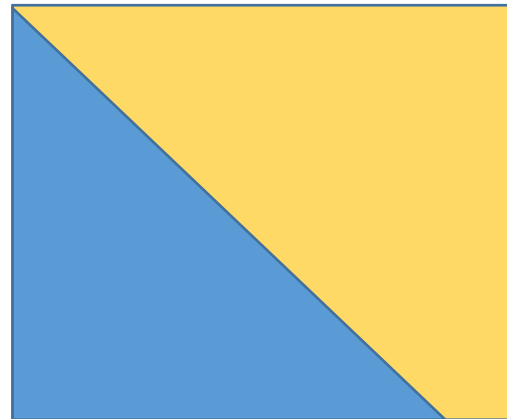
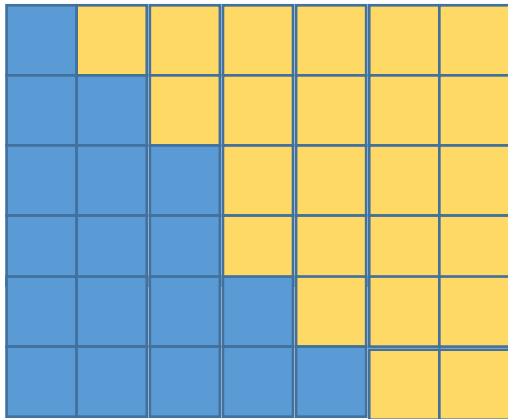


<https://www.neighbourhood.statistics.gov.uk/dissemination/LeadBoundaryViewerDisplay>.

Raster and vector data

Data can be in raster format (pixels)

Or Vector format (nodes and lines)

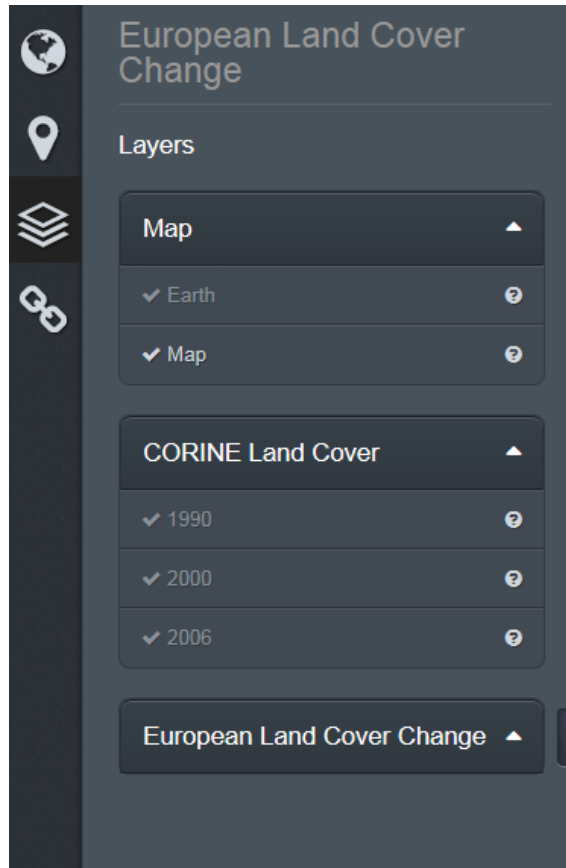


What makes a difference to data precision?

Data Layers

Go to

<https://europelandcover.ourecosystem.com/interface/>



Select Layers

Click on Map

Click on 1990 Corine Land Cover
– what happens? Why?

Click on 2000 Corine Land Cover
– what happens

Click on 2006 Corine Land Cover
– what changes?

These are layers – you can switch them on or off to see different data on a map

What do we need to do to layers to make sure they show correctly?

Importing data into Google Earth

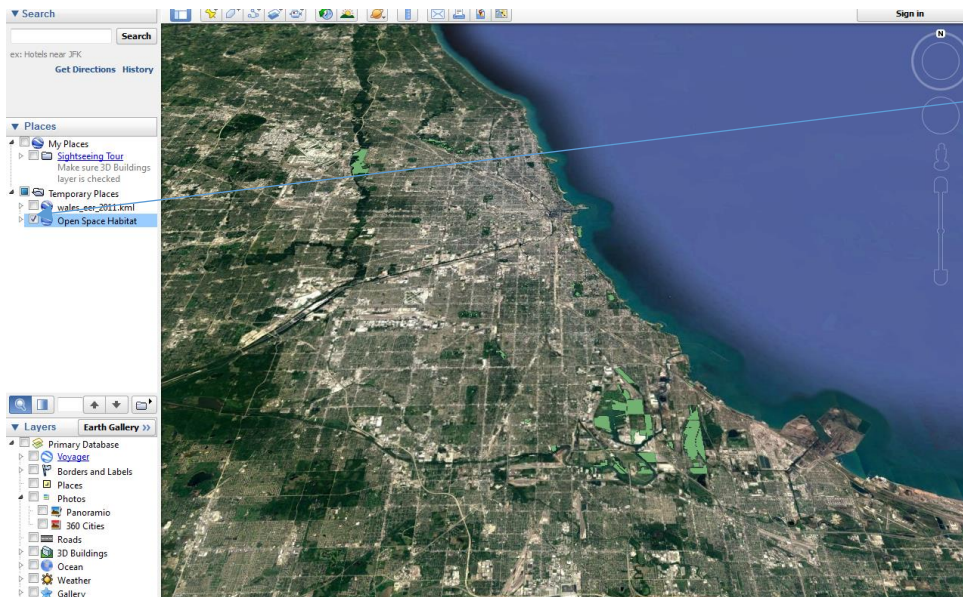
Go to

<https://data.cityofchicago.org/Environment-Sustainable-Development/Open-Spaces-Habitats-KML/atcy-53hp>

Download the openspaces habitats data (a kml file)

Go to Google Earth

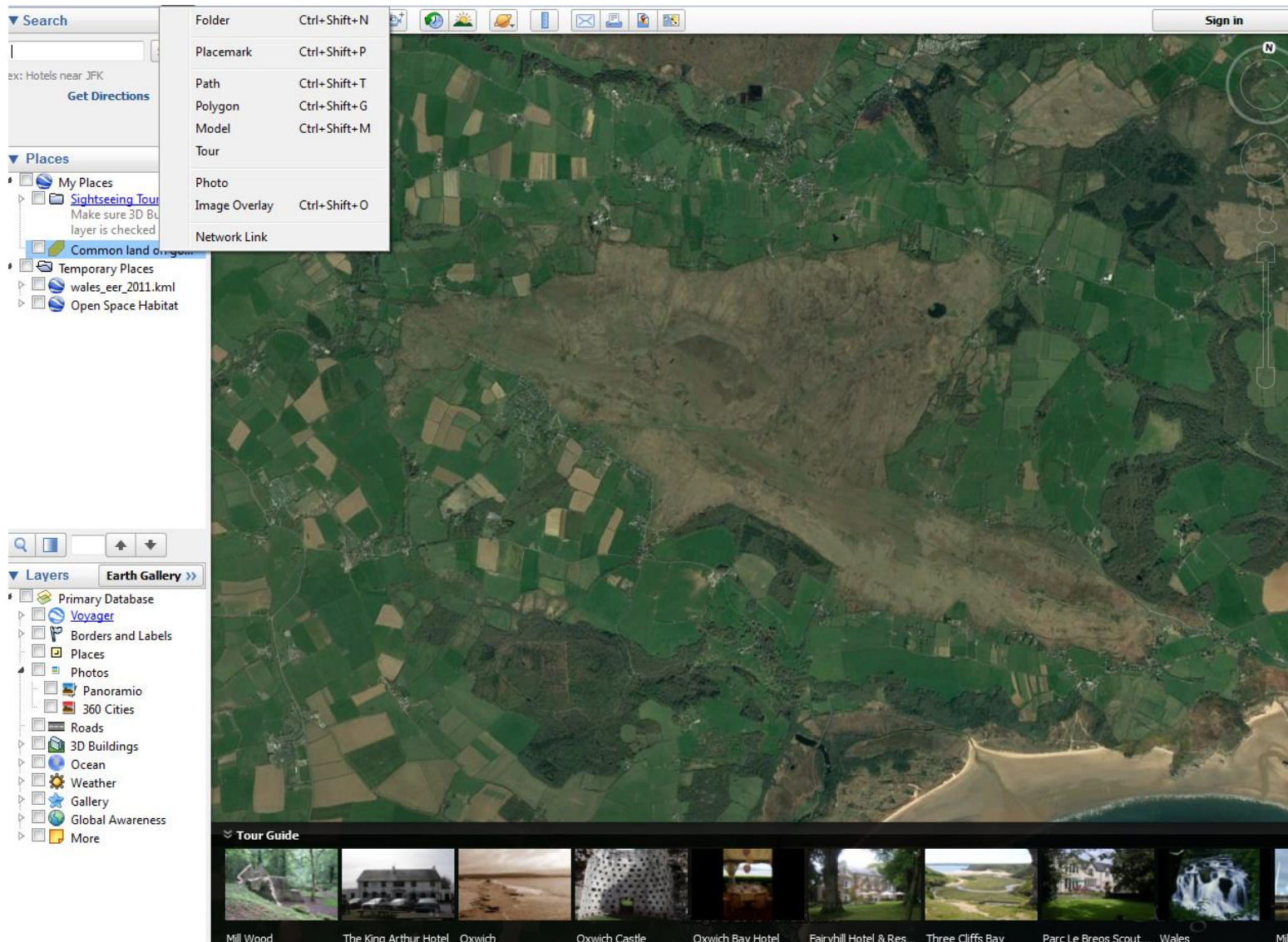
File - > Open - > open the habitats file from where you have saved it.



The file appears here

Click the tick box what happens when it is ticked? And unticked?

You can add your own places to Google Earth



Try drawing polygons around the common land on the Gower

You can save the files by right-clicking on the layer

Choose save.

You can save as Kmz or Kml format

If you have Google Earth Pro you can work out the area of the polygon!

GIS tools – Lots – here are three available on campus

MapInfo

ARC GIS

Q-GIS

Have a look

See if you can import a map

Draw a line/point/polygon

They are complicated packages – but lots of online help available...

Map Data – some free from OS maps

Edina Digimap – you need to sign up for a university log in and password.

Get some base maps for the sites you will be visiting over the fieldwork sessions

Draw habitat boundaries and other features onto the maps

Use these as a basis for map GIS skills later in year