

Research Methods Built Portfolio

Introduction to Geographical Information Systems

Tools for Spatial Data Management in built environment research



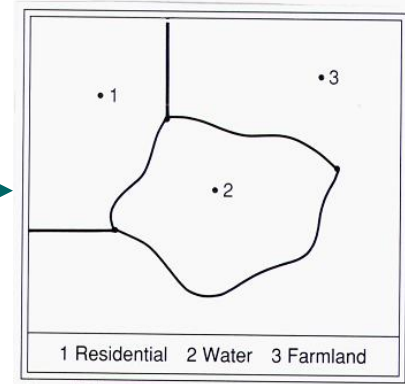
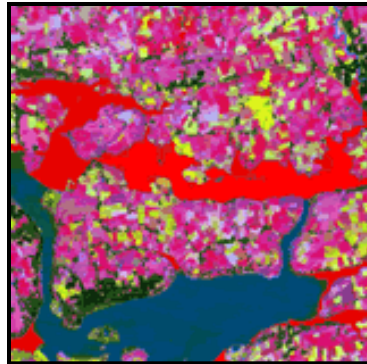
Adapted under permission from a presentation
constructed by Vicki O'Donnell

Coastal & Marine Resources Centre
Ionad Acmhainní Cósta is Mara



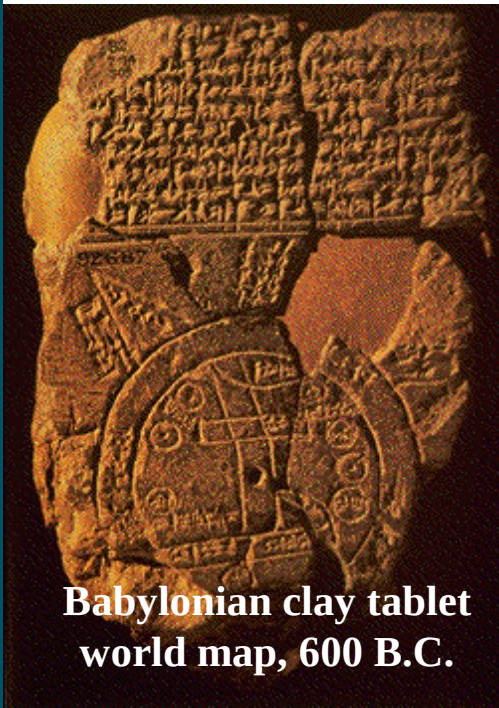
Today's Talk

- *The history of cartography*
- *Combining layers*
- *Going digital*
- *What is GIS?*
- *Measurement systems*
- *Data Types (vector, raster etc.)*
- *Data examples (base, infrastructure etc.)*
- *GIS examples (desktop, web-enabled etc.)*

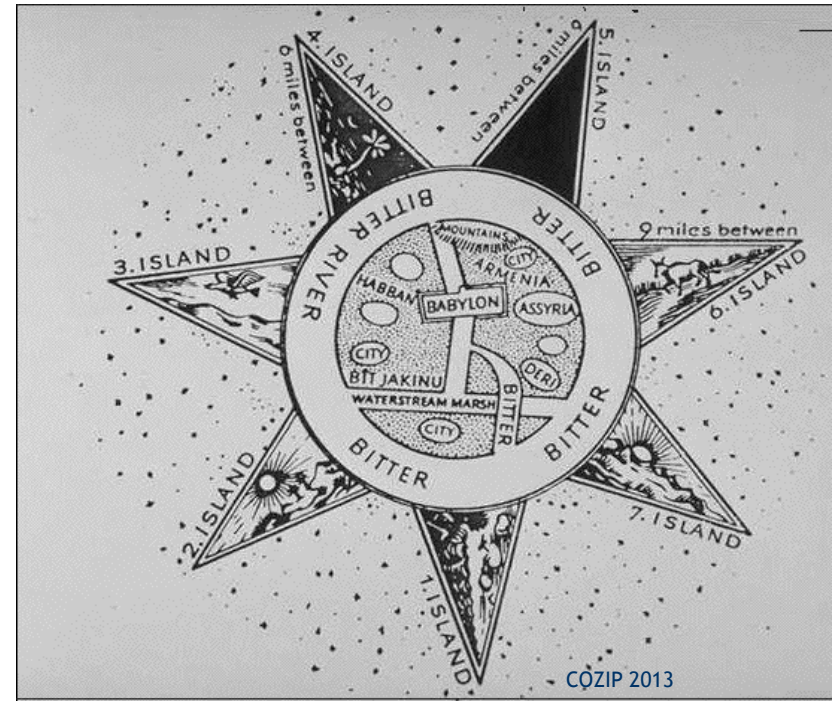


The early mapmakers

Cartography, or mapmaking, predates the art of writing. Maps drawn by ancient Babylonians, Egyptians, and Chinese have been found. One of the oldest known maps is a Babylonian clay tablet dating from c.2500 B.C., although a map found in on a wall of the Catal Huyuk settlement and is said to date back as far as 6200 BC.



**Babylonian clay tablet
world map, 600 B.C.**



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Scientific measurements of earth distances by means of meridians and parallels were first made by Eratosthenes (3rd Century B.C.).

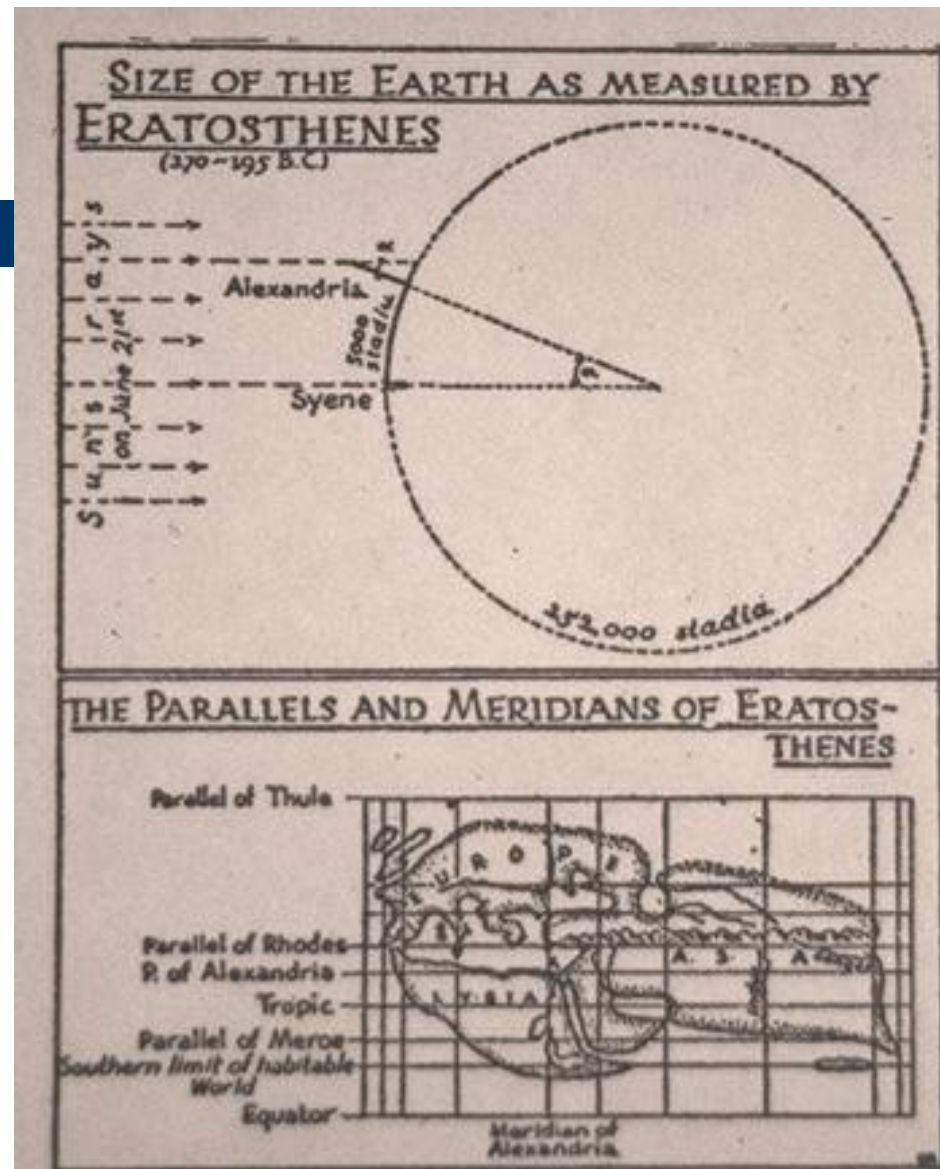
This technique is based on the observation that the sun is directly overhead at noon in Syene in southern Egypt on the first day of summer.

While visiting Syene Eratosthenes apparently stopped at a well and noted that the noon sun reflected directly back from the water in the bottom of the well.

The early mapmakers

Since Eratosthenes knew that the earth was a sphere, he correctly reasoned that if he could determine the altitude of the noon sun at some other location on the first day of summer, AND if he knew the distance between these two locations, he could compute the circumference of the earth as a simple ratio.

A reconstructed map of the world as known by Eratosthenes (3rd Century BC).



The early mapmakers



Of the ancient scholars, the mathematician and geographer Ptolemy (2nd century. A.D.), expounded on the principles of cartography.

His system was followed for many centuries, although his basic error in underestimating the earth's size was not corrected until the age of Mercator (1500s)

Only the Mediterranean world was represented with any accuracy in early maps. During the Middle Ages the European cartographers produced artistic, idealised maps.

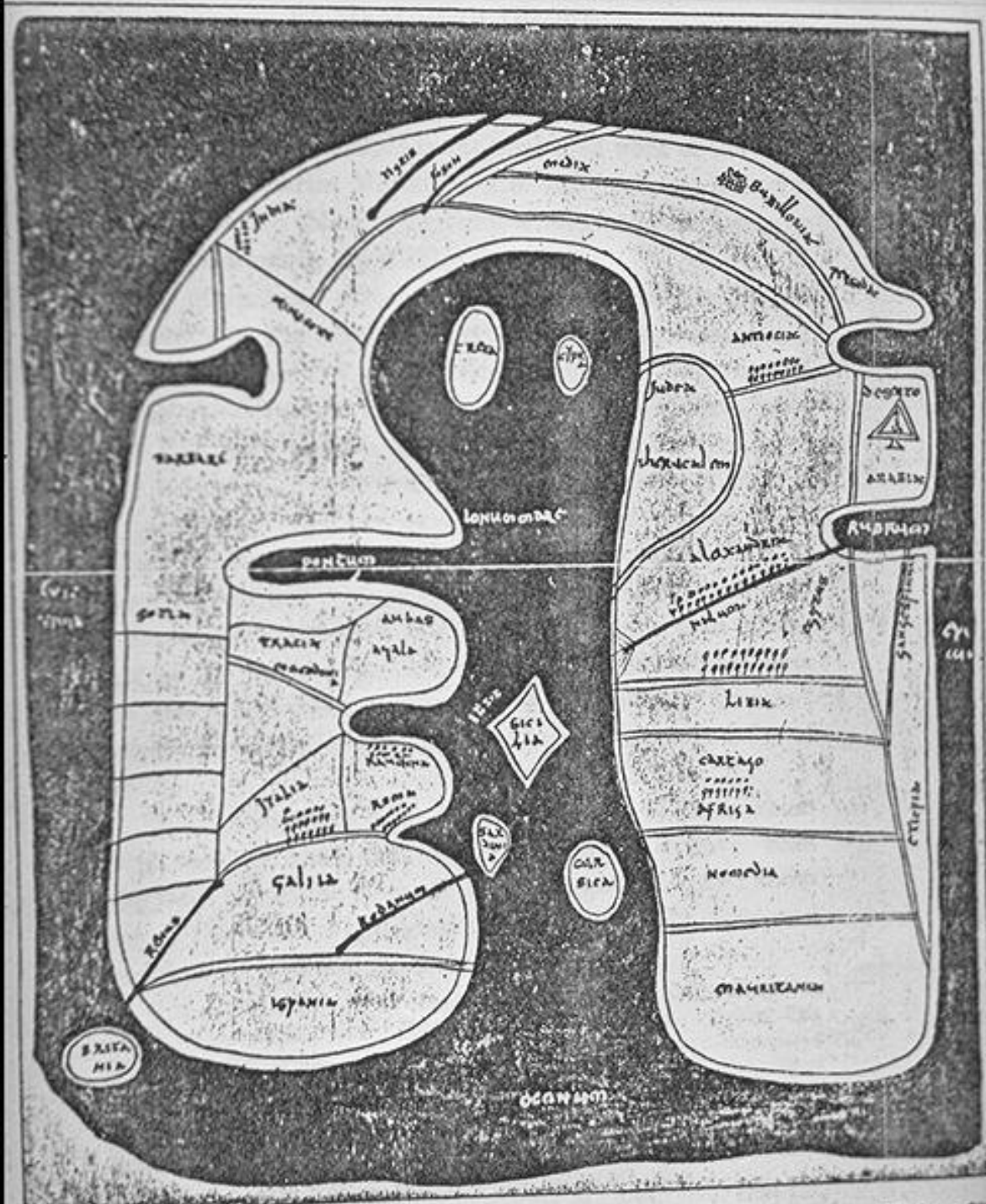
Arabic mapmakers, notably Idrisi (12th century AD.), carried on the work of Ptolemy, and the Chinese produced the first printed maps.

The early mapmakers

Three major events contributed to the spectacular renaissance of cartography in Europe around 1500

- the rediscovery and translation into Latin of Ptolemy's *Geographia*
 - the invention of printing and engraving
 - and the great voyages of discovery.
- This renaissance was manifested by the work of Gerardus Mercator in the first modern world atlas, published in 1570





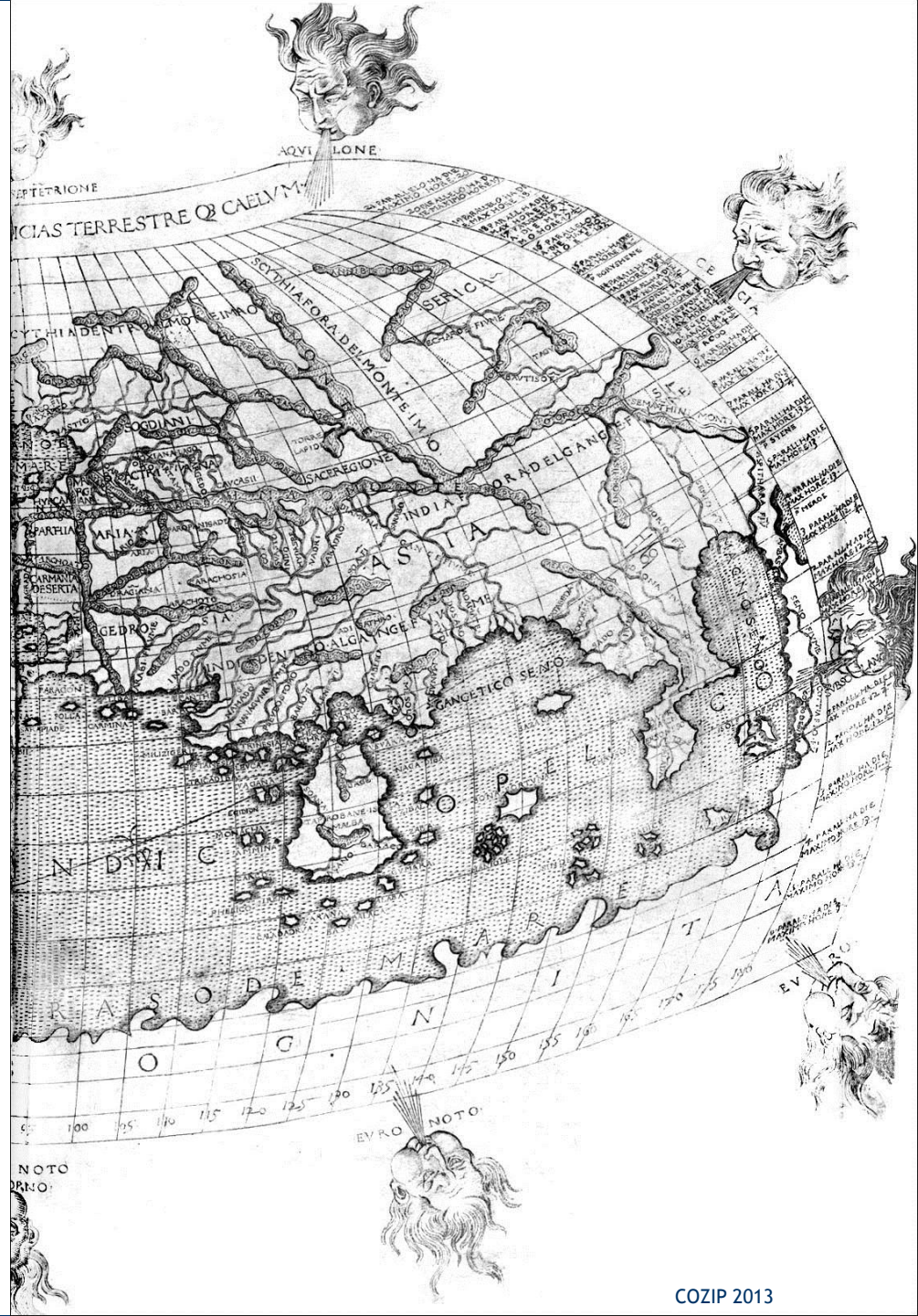
Oldest surviving detailed
world map from the 8th
Century

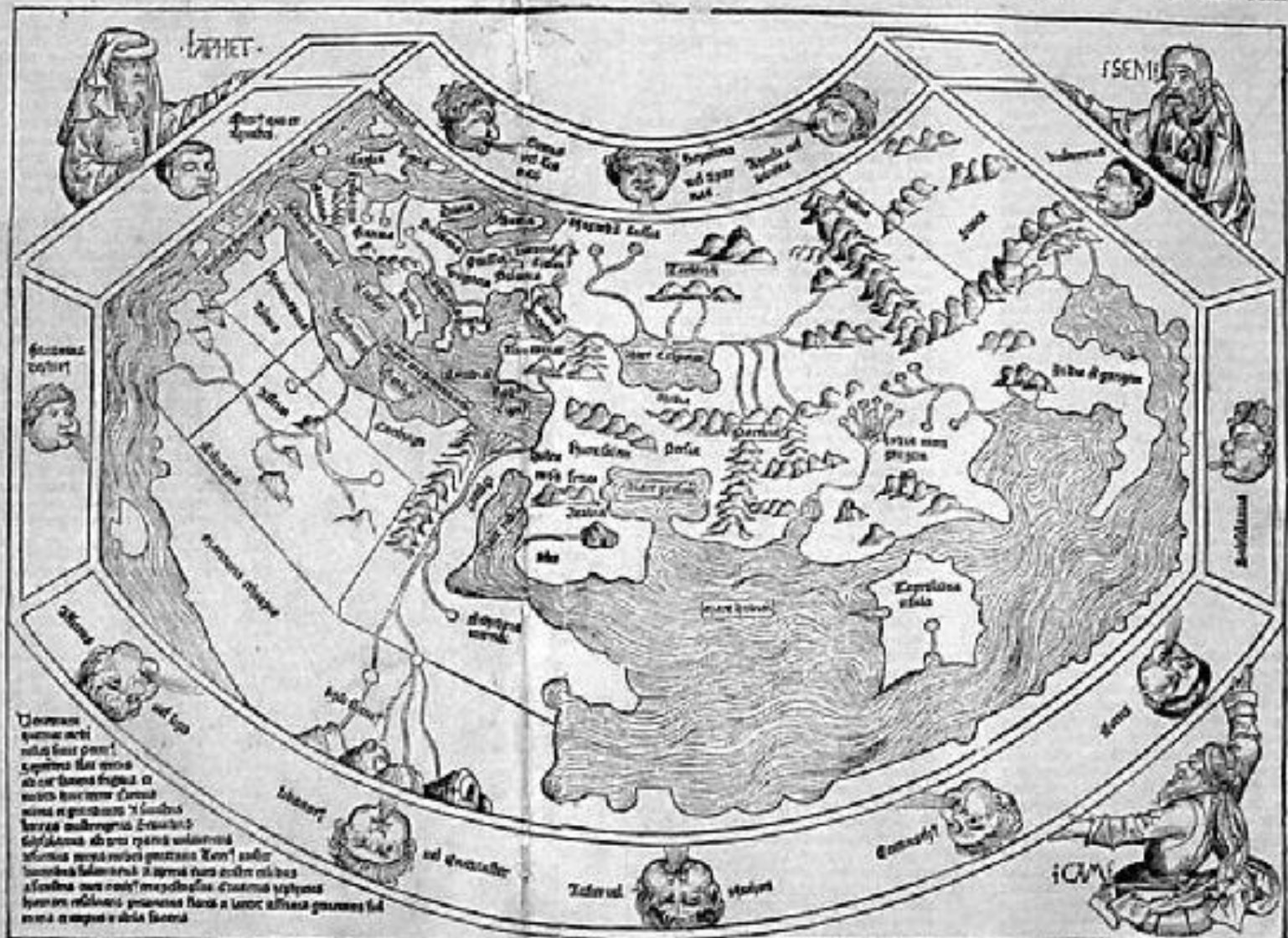


Laurentian Sea Atlas or Medici Atlas, 1351

Celestial atlas - edited by Jean Fortin (1776), which was used by the Bernese artist Franz Niklaus König

Eastern portion of world map
from Ptolemy, *Geographia*.
Florence: Nicolo Todescho, ca.
1480-82.

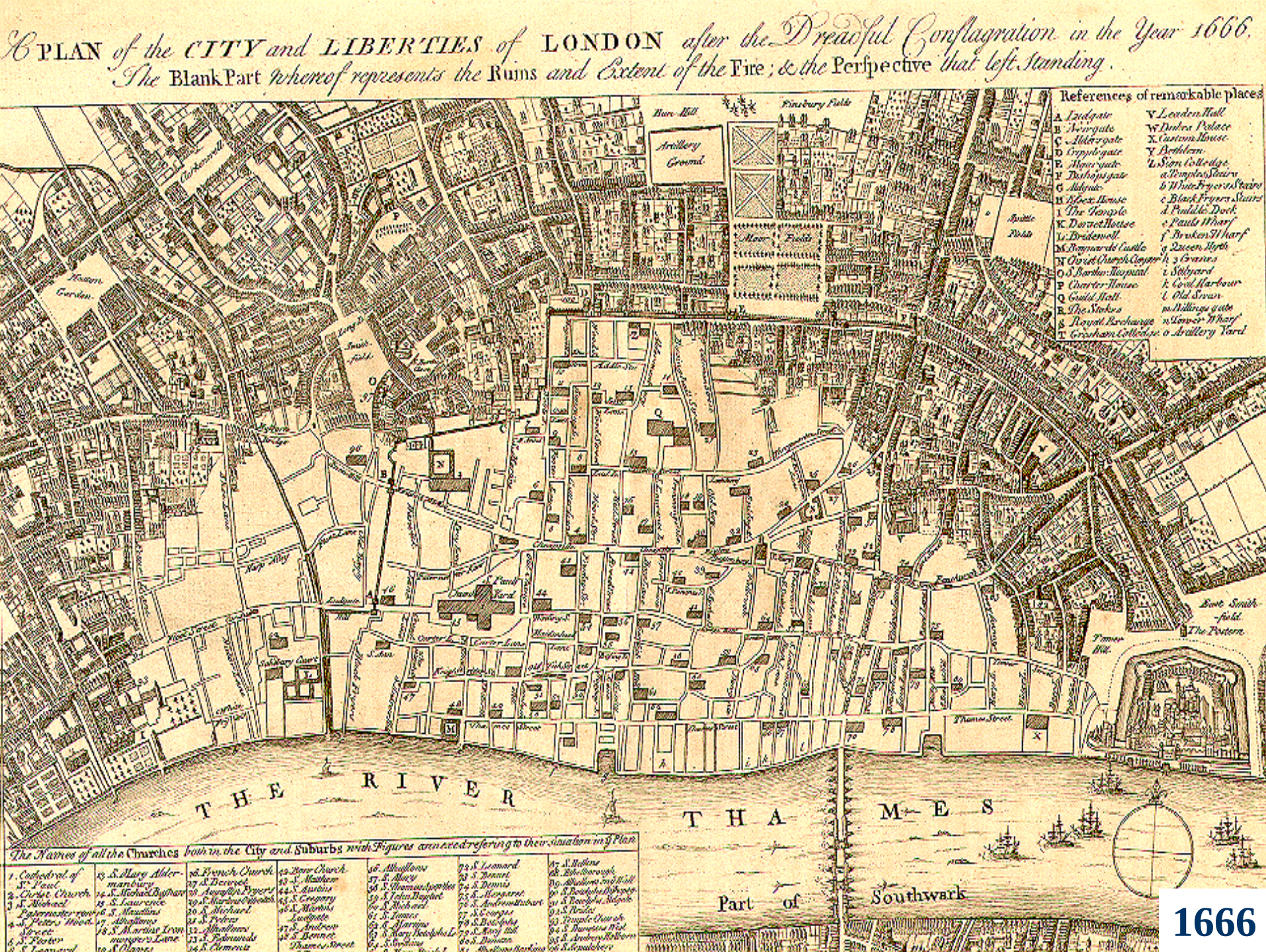


[illegible][illegible]

TABVLA EVROPAE I.







A PLAN of the CITY and LIBERTIES of LONDON after the Dreadful Conflagration in the Year 1666. The Blank Part wherof represents the Ruins and Extent of the Fire; & the Perspective that left Standing.

References of remarkable places

- | | |
|--------------------|-----------------------|
| A Ludgate | V London Wall |
| B Avingate | W Dukes Palace |
| C Alder gate | X Cannon House |
| D Groppe gate | Y Bredford |
| E Moor gate | Z Lion Colledge |
| F Bishop's gate | a Temple Stairs |
| G Aldgate | b White Fryers Stairs |
| H Fleet House | c Black Fryers Stairs |
| I The Temple | d Pauls Dock |
| K Down House | e Pauls Wharf |
| L Broadwell | f Broken Wharf |
| M Baynard's Castle | g Queen North |
| N Christ Church | h Graves |
| O St. Bartholomew | i St. James |
| P Charter House | k Coal Harbour |
| Q Guild Hall | l Old Swan |
| R The Naves | m Millers gate |
| S Royal Exchange | n Tower Wharf |
| T Grisham Colledge | o Artillery Yard |

The Names of all the Churches both in the City and Suburbs with Figures annexed referring to their situation in this Plan

1. Cathedral of St. Paul	13. S. Mary Aldermanbury	25. French Church	37. S. Leonard	49. S. Martin
2. Christ Church	14. S. Michael Bitham	26. S. Bernard	50. S. Dennis	51. S. Mary
3. St. Michael	15. S. Lawrence	27. S. Andrew	52. S. Margaret	52. S. Mary
4. St. Peter's Wood	16. S. Lawrence	28. S. Andrew	53. S. Andrew	53. S. Mary
5. St. Peter's Wood	17. S. Lawrence	29. S. Andrew	54. S. Andrew	54. S. Mary
6. St. Peter's Wood	18. S. Lawrence	30. S. Andrew	55. S. Andrew	55. S. Mary
7. St. Peter's Wood	19. S. Lawrence	31. S. Andrew	56. S. Andrew	56. S. Mary
8. St. Peter's Wood	20. S. Lawrence	32. S. Andrew	57. S. Andrew	57. S. Mary
9. St. Peter's Wood	21. S. Lawrence	33. S. Andrew	58. S. Andrew	58. S. Mary
10. St. Peter's Wood	22. S. Lawrence	34. S. Andrew	59. S. Andrew	59. S. Mary
11. St. Peter's Wood	23. S. Lawrence	35. S. Andrew	60. S. Andrew	60. S. Mary
12. St. Peter's Wood	24. S. Lawrence	36. S. Andrew	61. S. Andrew	61. S. Mary
13. St. Peter's Wood	25. S. Lawrence	37. S. Andrew	62. S. Andrew	62. S. Mary
14. St. Peter's Wood	26. S. Lawrence	38. S. Andrew	63. S. Andrew	63. S. Mary
15. St. Peter's Wood	27. S. Lawrence	39. S. Andrew	64. S. Andrew	64. S. Mary
16. St. Peter's Wood	28. S. Lawrence	40. S. Andrew	65. S. Andrew	65. S. Mary
17. St. Peter's Wood	29. S. Lawrence	41. S. Andrew	66. S. Andrew	66. S. Mary
18. St. Peter's Wood	30. S. Lawrence	42. S. Andrew	67. S. Andrew	67. S. Mary
19. St. Peter's Wood	31. S. Lawrence	43. S. Andrew	68. S. Andrew	68. S. Mary
20. St. Peter's Wood	32. S. Lawrence	44. S. Andrew	69. S. Andrew	69. S. Mary
21. St. Peter's Wood	33. S. Lawrence	45. S. Andrew	70. S. Andrew	70. S. Mary
22. St. Peter's Wood	34. S. Lawrence	46. S. Andrew	71. S. Andrew	71. S. Mary
23. St. Peter's Wood	35. S. Lawrence	47. S. Andrew	72. S. Andrew	72. S. Mary
24. St. Peter's Wood	36. S. Lawrence	48. S. Andrew	73. S. Andrew	73. S. Mary
25. St. Peter's Wood	37. S. Lawrence	49. S. Andrew	74. S. Andrew	74. S. Mary
26. St. Peter's Wood	38. S. Lawrence	50. S. Andrew	75. S. Andrew	75. S. Mary
27. St. Peter's Wood	39. S. Lawrence	51. S. Andrew	76. S. Andrew	76. S. Mary
28. St. Peter's Wood	40. S. Lawrence	52. S. Andrew	77. S. Andrew	77. S. Mary
29. St. Peter's Wood	41. S. Lawrence	53. S. Andrew	78. S. Andrew	78. S. Mary
30. St. Peter's Wood	42. S. Lawrence	54. S. Andrew	79. S. Andrew	79. S. Mary
31. St. Peter's Wood	43. S. Lawrence	55. S. Andrew	80. S. Andrew	80. S. Mary
32. St. Peter's Wood	44. S. Lawrence	56. S. Andrew	81. S. Andrew	81. S. Mary
33. St. Peter's Wood	45. S. Lawrence	57. S. Andrew	82. S. Andrew	82. S. Mary
34. St. Peter's Wood	46. S. Lawrence	58. S. Andrew	83. S. Andrew	83. S. Mary
35. St. Peter's Wood	47. S. Lawrence	59. S. Andrew	84. S. Andrew	84. S. Mary
36. St. Peter's Wood	48. S. Lawrence	60. S. Andrew	85. S. Andrew	85. S. Mary
37. St. Peter's Wood	49. S. Lawrence	61. S. Andrew	86. S. Andrew	86. S. Mary
38. St. Peter's Wood	50. S. Lawrence	62. S. Andrew	87. S. Andrew	87. S. Mary
39. St. Peter's Wood	51. S. Lawrence	63. S. Andrew	88. S. Andrew	88. S. Mary
40. St. Peter's Wood	52. S. Lawrence	64. S. Andrew	89. S. Andrew	89. S. Mary
41. St. Peter's Wood	53. S. Lawrence	65. S. Andrew	90. S. Andrew	90. S. Mary
42. St. Peter's Wood	54. S. Lawrence	66. S. Andrew	91. S. Andrew	91. S. Mary
43. St. Peter's Wood	55. S. Lawrence	67. S. Andrew	92. S. Andrew	92. S. Mary
44. St. Peter's Wood	56. S. Lawrence	68. S. Andrew	93. S. Andrew	93. S. Mary
45. St. Peter's Wood	57. S. Lawrence	69. S. Andrew	94. S. Andrew	94. S. Mary
46. St. Peter's Wood	58. S. Lawrence	70. S. Andrew	95. S. Andrew	95. S. Mary
47. St. Peter's Wood	59. S. Lawrence	71. S. Andrew	96. S. Andrew	96. S. Mary
48. St. Peter's Wood	60. S. Lawrence	72. S. Andrew	97. S. Andrew	97. S. Mary
49. St. Peter's Wood	61. S. Lawrence	73. S. Andrew	98. S. Andrew	98. S. Mary
50. St. Peter's Wood	62. S. Lawrence	74. S. Andrew	99. S. Andrew	99. S. Mary
51. St. Peter's Wood	63. S. Lawrence	75. S. Andrew	100. S. Andrew	100. S. Mary

THE RIVER THAMES

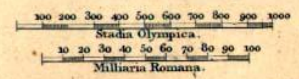
Part of Southwark

1666



1849

ASIA MINOR.



SAUCIATUS MEDICO INDIGET.

G 48

CORCKE in Engelhard

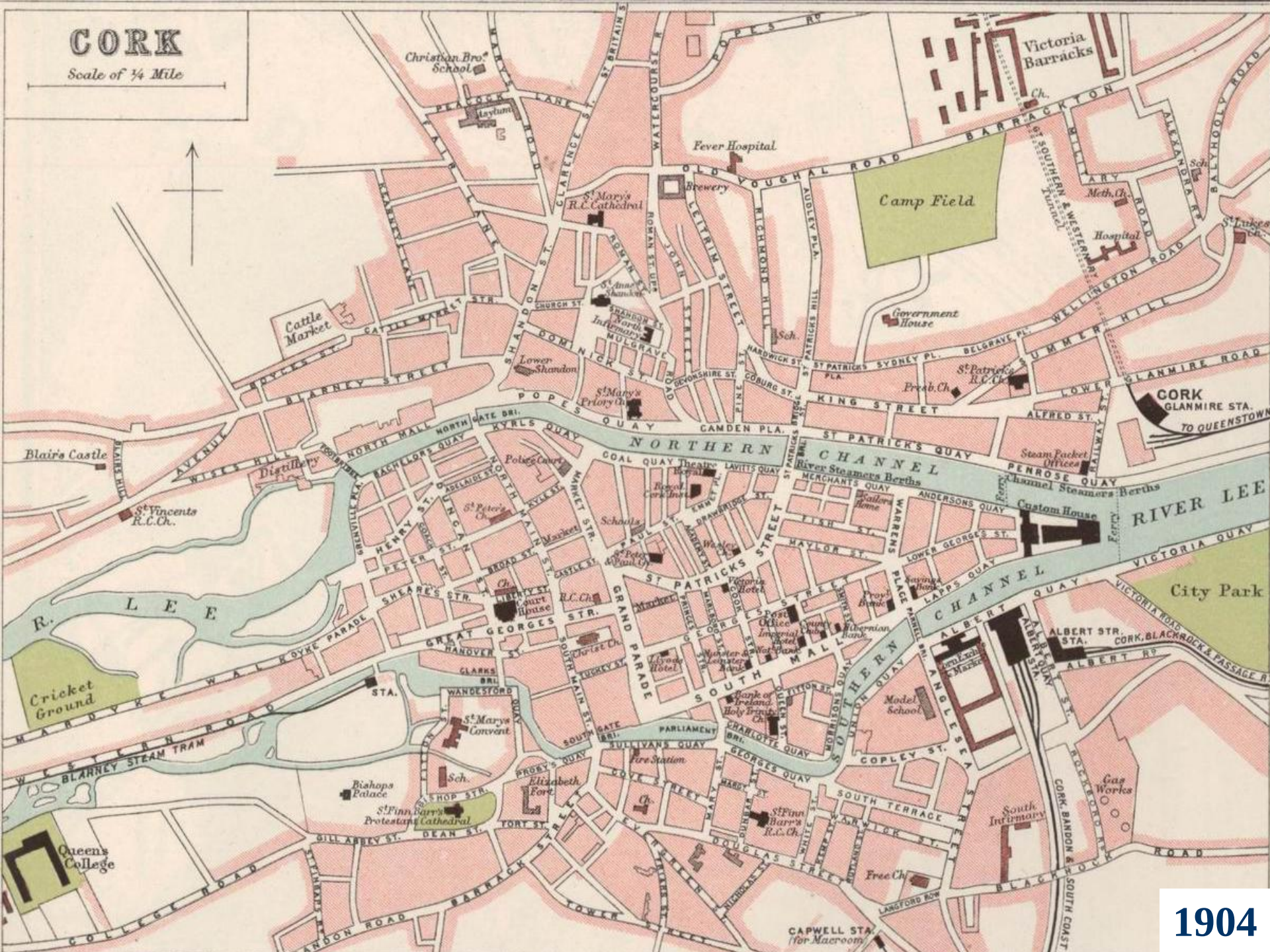


Cervus ubi venatoris malelagus fortè sagitta est, Ad medicum sanans, amicus ipse fugit.

Der Hirsch begirlich in der eil, Wann in ihm steck des Jägers Pfeil.	Brauchet von Diptam Medicin, Diss Kraut durch sein Krafft heilet Ihn.
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CORK

Scale of ¼ Mile



Mapping - combining layers - adding data

Idea of portraying different layers of data on a series of base maps, and relating things geographically, has been around much longer than computers:

- Maps of the Battle of Yorktown (American Revolution) drawn by the French Cartographer Louis-Alexandre Berthier contained hinged overlays to show troop movements
- The mid-19th Century "Atlas to Accompany the Second report of the Irish Railway Commissioners" showed population, traffic flow, geology and topography superimposed on the same base map
- Dr. John Snow used a map showing the locations of death by cholera in central London in September, 1854 to track the source of the outbreak to a contaminated well - an early example of geographical analysis



Mapping - combining layers - adding data

With more elaborate urban planning in the 19th and early 20th centuries, *map overlays* had become popular. These were translucent paper (and later, plastic) sheets upon which maps were drawn or printed. For example, a map of site drainage could be overlaid on a topographic map of the site, or on a street plan.

The earliest attempt to automate map production was the *Atlas of British Flora*, which used a punch-card tabulator to produce maps on pre-printed paper from cards that recorded map coordinates of plant occurrences.

Slightly later work by Bertin (circa 1967) involved modification of IBM Selectric typewriters driven by punch-card readers to produce maps with proportional symbols.

Mapping - combining layers - adding data

Selectric typewriters



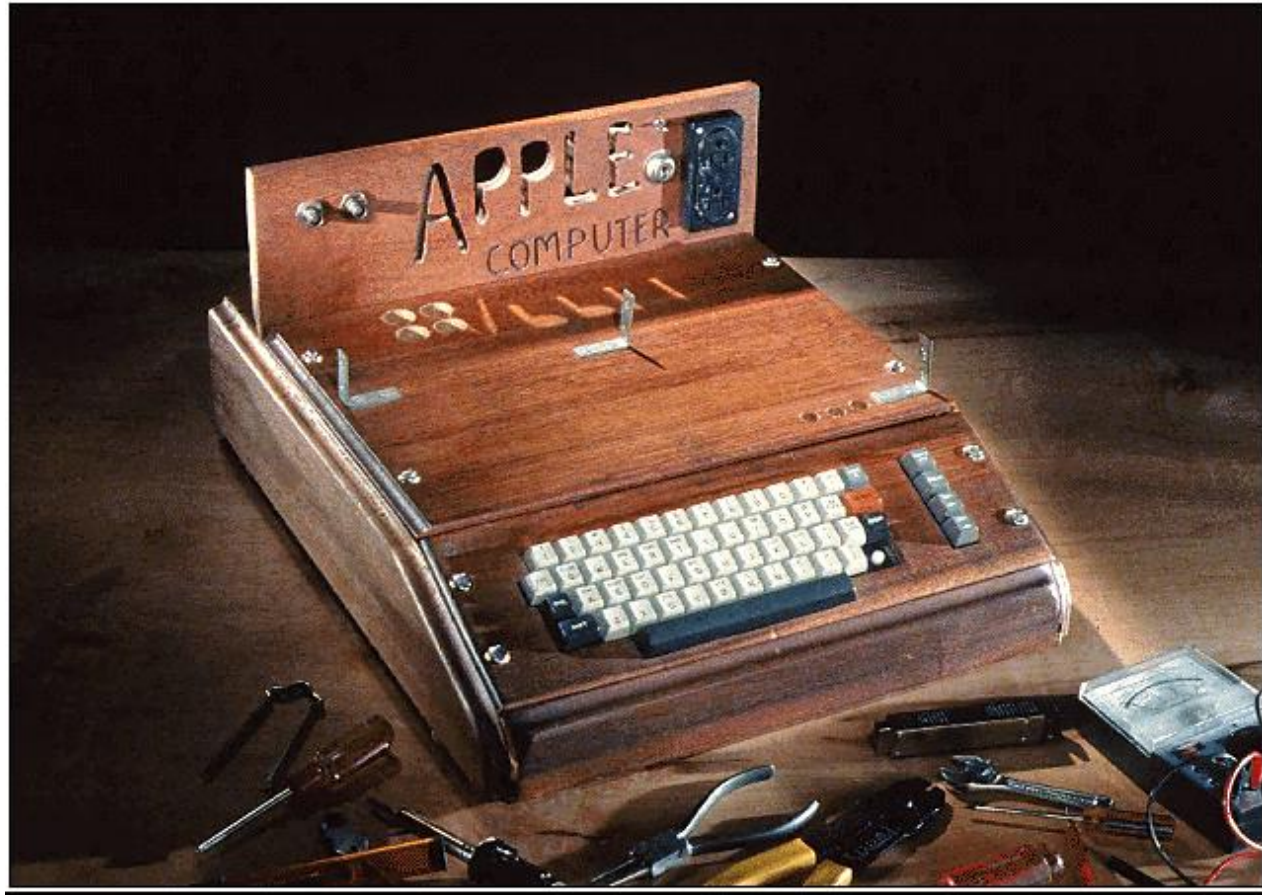
Going digital

several factors caused a change in mapping

- computer technology - improvements in hardware, esp. graphics
- development of theories of spatial processes in economic and social geography, anthropology, regional science, urban planning and construction
- increasing social awareness, education levels and mobility, awareness of environmental problems

Going digital

- Apple 1 - 1976



Digital v paper

Limitations of paper

- Original data and crucial information often has to be omitted
- Several maps sheets may be required for area of interest
- A printed map is static, spatial analysis very difficult
- Representations of volume is very difficult
- Printed map represents an instant in time

Advantages of digital

- Quicker, easier and cheaper to update maps
- Create maps for specific uses
- Experiment with different graphic representations
- Facilitate interactions between statistical analysis and mapping
- Control classification and generalisation

Pioneers

The Development of GIS

- Geographic Information System has its roots in Canada. The produced one of the earliest GISs, started in the mid '60's
- is a large scale system still operating today, to analyse the data collected by the Canada Land Inventory (CLI) and to produce statistics to be used in developing land management plans for large areas of rural Canada
- its development provided many conceptual and technical contributions to today's GIS systems



What is Geographical Information Systems?

GIS?

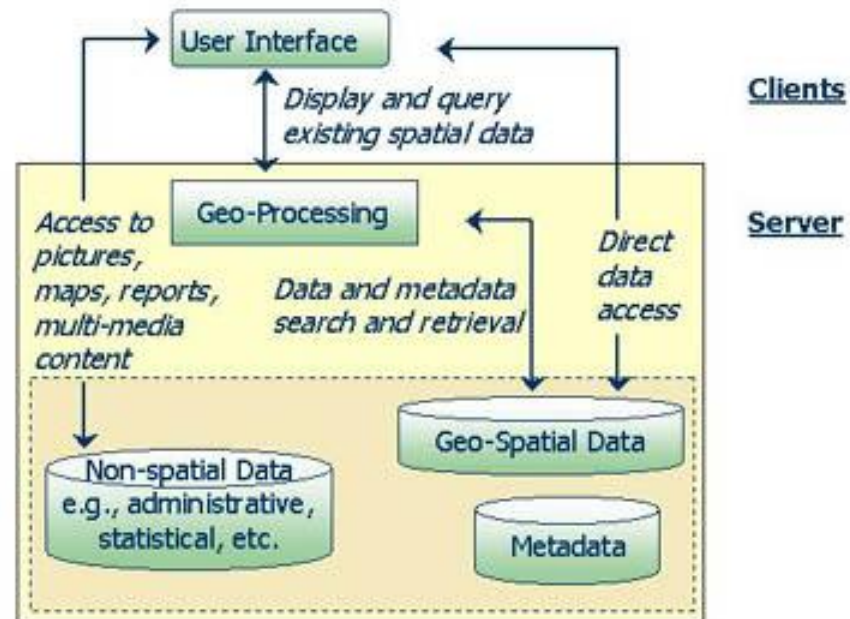
What is a GI System?

Historically...

- Tools to help import data
- Database
- Database management system
- Tools to transform and analysis spatial data
- Tools for displaying and printing data

Presently...

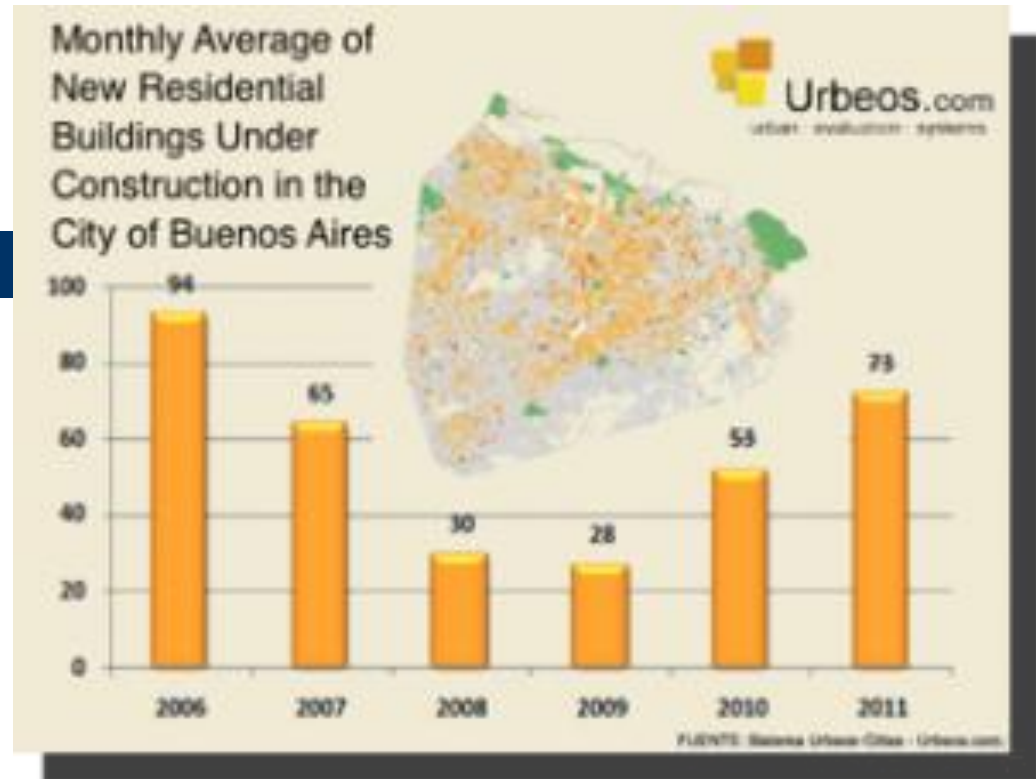
- Clients and servers
- Internet visualisation and open GIS Data Repositories
- User interface - non expert use



GIS functionality

•3 Primary Functions

- Automated mapping
- Data management
- Spatial analysis



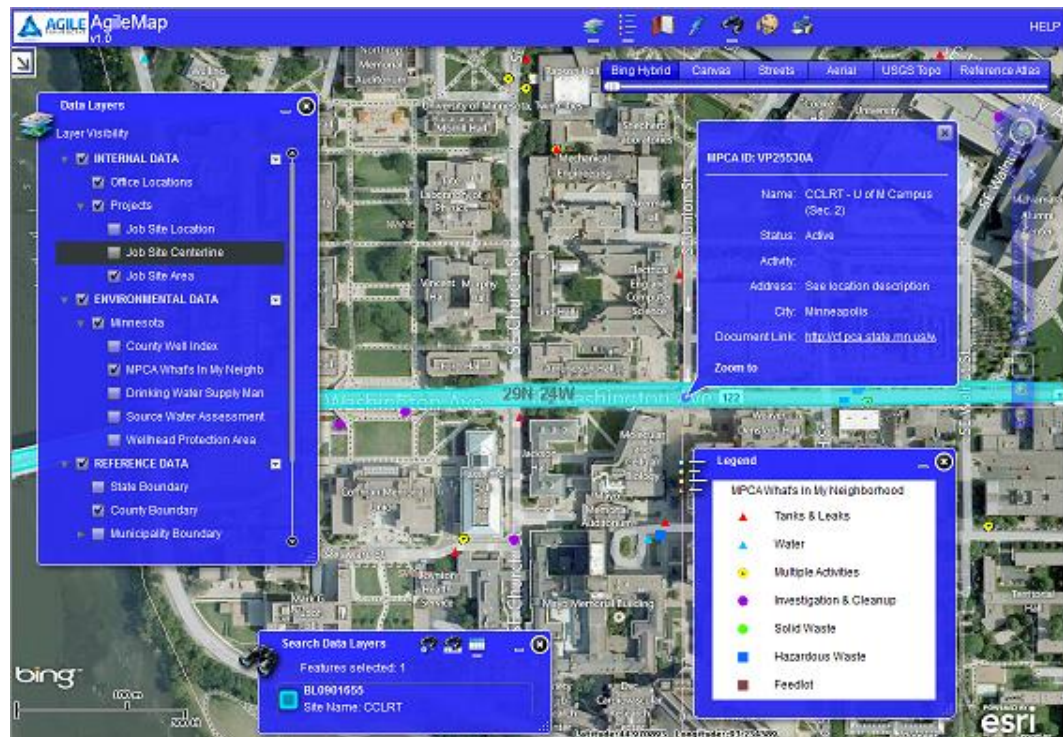
•Additional Functionality

- Communications (electronic file transfer etc)
- Graphical User Interface (GUI)
- Creation of symbols and other cartographic design features
- Interface with existing packages
- Customised programming, e.g. batch conversions etc

GIS functionality

Typical GIS

- Represent space in two dimensions
- 3D integrated into many software programs as add-on or separate visualisation tools
- 4D now coming to the fore in relation to marine research (e.g. temporal analysis)



GIS functionality

Only maps?

Maps are often seen as the basis of GIS as they are at the 'front end'

They are not the **KEY ELEMENT**

The Key element is the ability to use georeferencing to tie together/relate all the information in a quantitative manner

Useful for research (dissertation)

Information could include

- Graphs
- Imagery
- Video footage
- Text
- Ground survey data



Residual / Exclusion Areas Map



Final Output Map



The simple question

Construction question

Where does the first sample bores go?

What are the soil properties of the site?

How are the houses and infrastructure distributed on the site?

Generic question

Where is object A?

Where is object A?

Where is object A?

The simple question

Construction question

What proportion of houses to shops on the site?

Are there fewer than expected delivery problems at different parts of the site?

How many woodlands are there within 200m of the proposed new motorway?

Generic question

How many occurrences of type *A* are there within a distance, *D*, of place *B*?

How many occurrences of type *A* are there within a distance, *D*, of place *B*?

How many occurrences of type *A* are there within a distance, *D*, of place *B*?

The simple question

Construction question

What is the effect of a longer working day over a 6month period on the productivity of the brick layers on site?

What is the rate of erosion likely to be in this site in the next 10 years if we use Pennant Sandstone for building?

What is the long-term effect a new construction technique on sites exposed to South westerly storms?

Generic question

What is the effect of process, P , over time, T , for a given scenario, S ?

What is the effect of process, P , over time, T , for a given scenario, S ?

What is the effect of process, P , over time, T , for a given scenario, S ?

Measurement systems

Scale

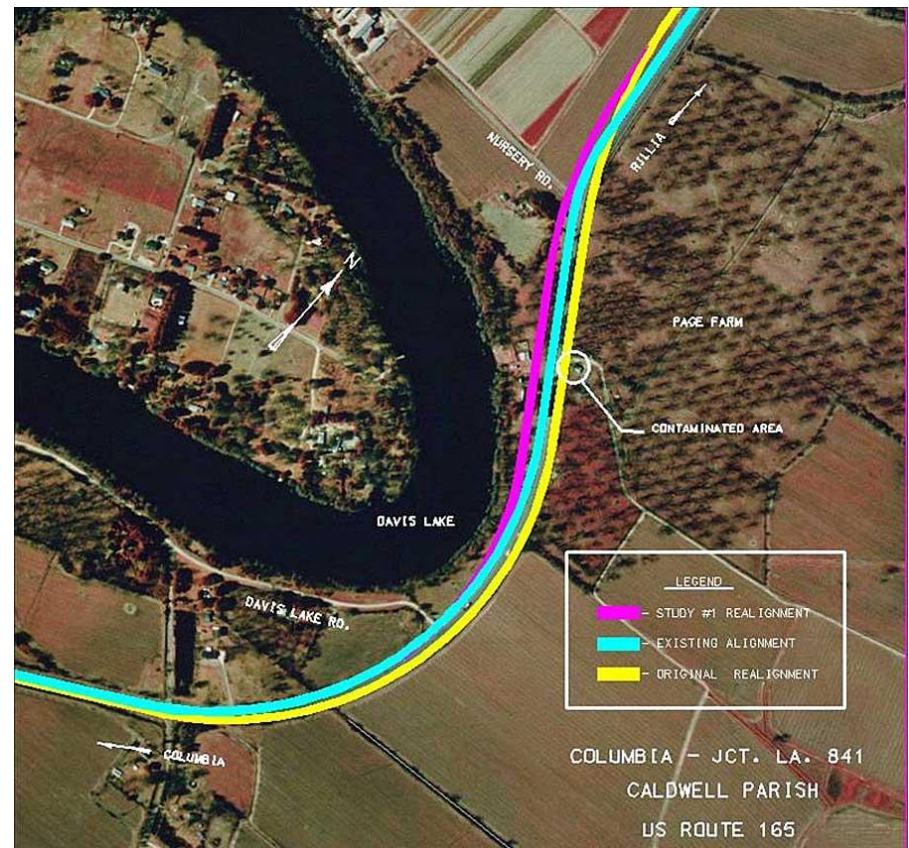
To show a portion of the earth's surface on a map it is necessary to reduce the size of the original. The extent of the reduction is known as the **scale**

1 inch = 1 mile

1 inch = 63,360 inches

1:63360

All refer to the same scale



Measurement systems

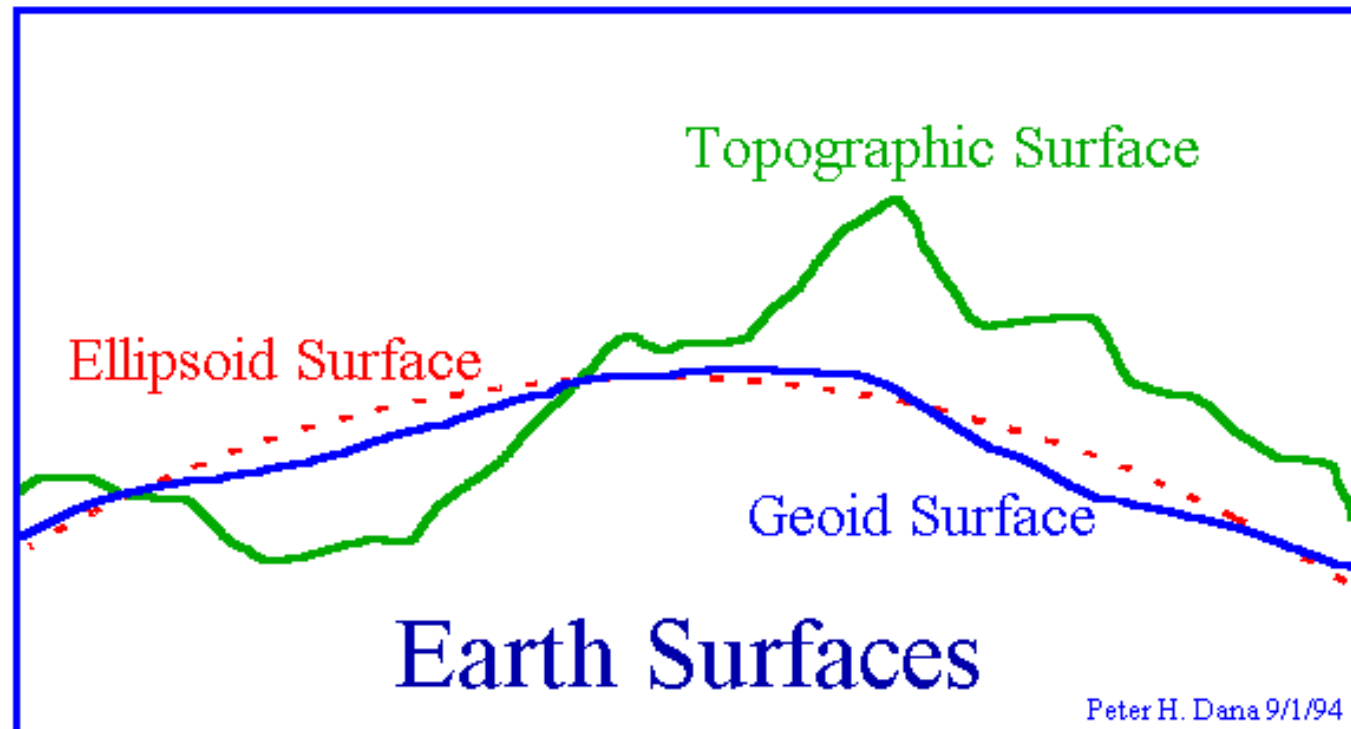
The earth can be assumed as a **sphere** at small scales ($< 1:5,000,000$) but at large scales ($>1:1,000,000$) it must be treated as a spheroid (or ellipsoid)

But the earth is not a perfect spheroid so the best estimates of its parameters vary depending on the local data used to estimate them

They **spheroid** used forms part of the datum, which forms part of the information which must be provided for a full specification of the reference systems. In Ireland we use values calculated by Airy in 1830 (modified in 1849)

Geoid

Locational data calculated relative to a **spheroid** are generally sufficient for most GIS purposes, however for detailed measurements, especially in relation to elevation, it is necessary to make measurements relative to a **GEOID**

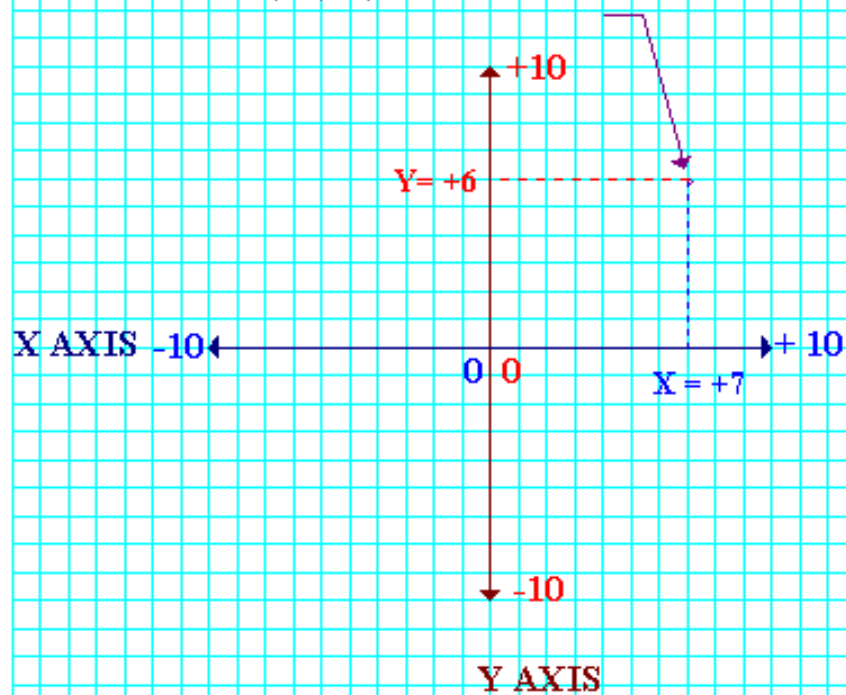


Measurement systems

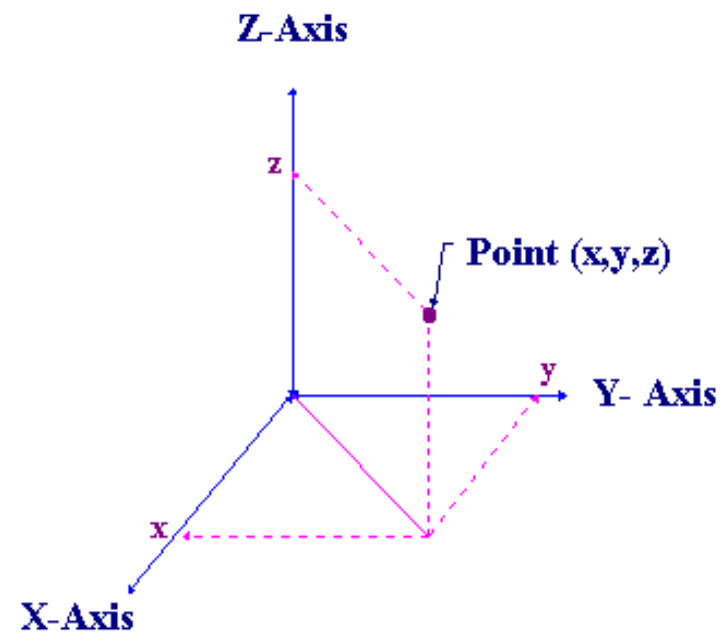
coordinates

- There are many basic coordinate systems
- These systems can represent points in two-dimensional or three-dimensional space.
- René Descartes (1596-1650) introduced systems of coordinates based on orthogonal (right angle) coordinates.
- These two and three-dimensional systems used in analytic geometry are often referred to as Cartesian systems.

Point with X and Y Coordinates
of $X = +7$ and $Y = +6$
Expressed as Ordered Pair
 $(+7, +6)$



Cartesian Coordinates in a Plane
A Point Defined by X and Y Coordinates

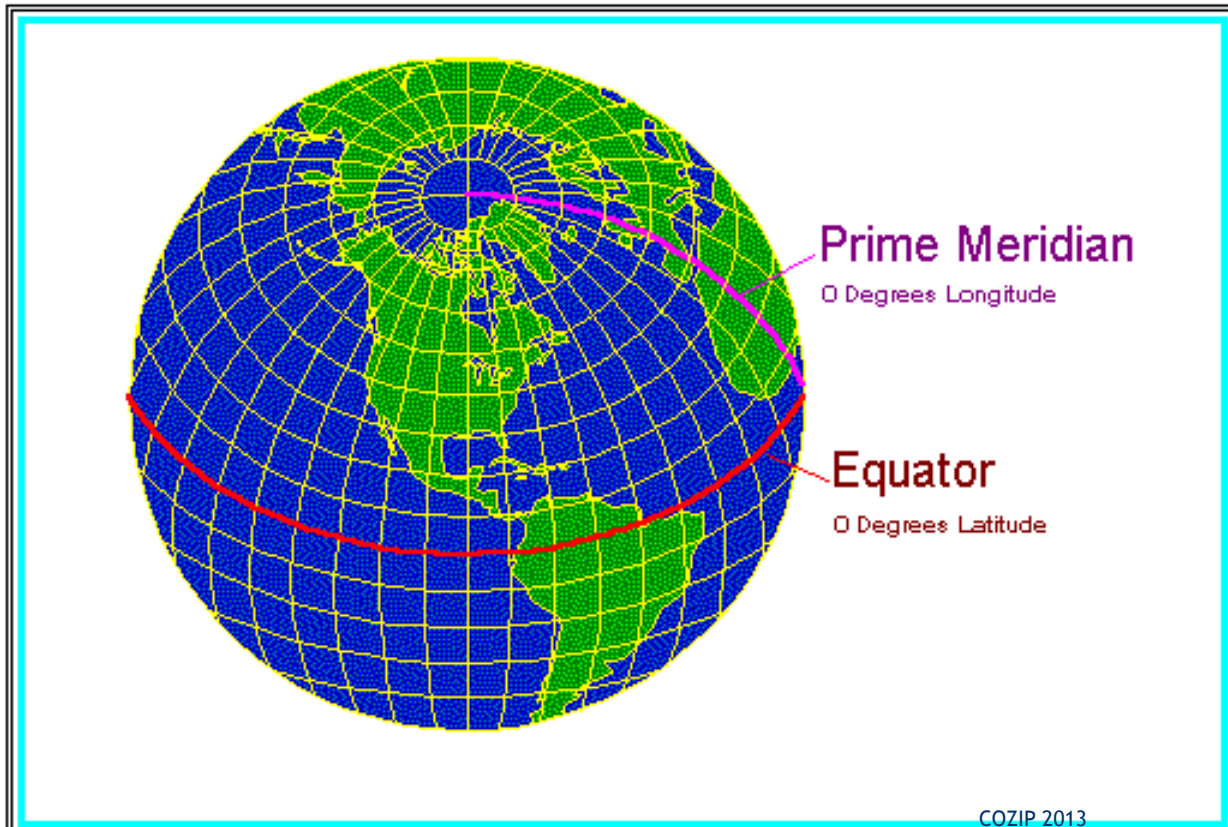


Three-Dimensional Cartesian Coordinates
X, Y, Z

Coordinate systems

Global Latitude, Longitude, Height

- The most commonly used coordinate system today is the latitude, longitude, and height system.



Measurement systems

National

Irish National Grid

- The Irish National Grid (ING) is administered by the Ordnance Survey of Ireland.
- The ING has been based on a Transverse Mercator projection since the 1920s.
- The ING is based on the Ireland Datum 1965.
- The true origin of the system is at 53 degrees, 30 minutes north latitude and 8 degrees west longitude.
- The false origin is 200 km west and 250 km south of the true origin.
- Scale at the central meridian is 1.000035.

Measurement systems

National

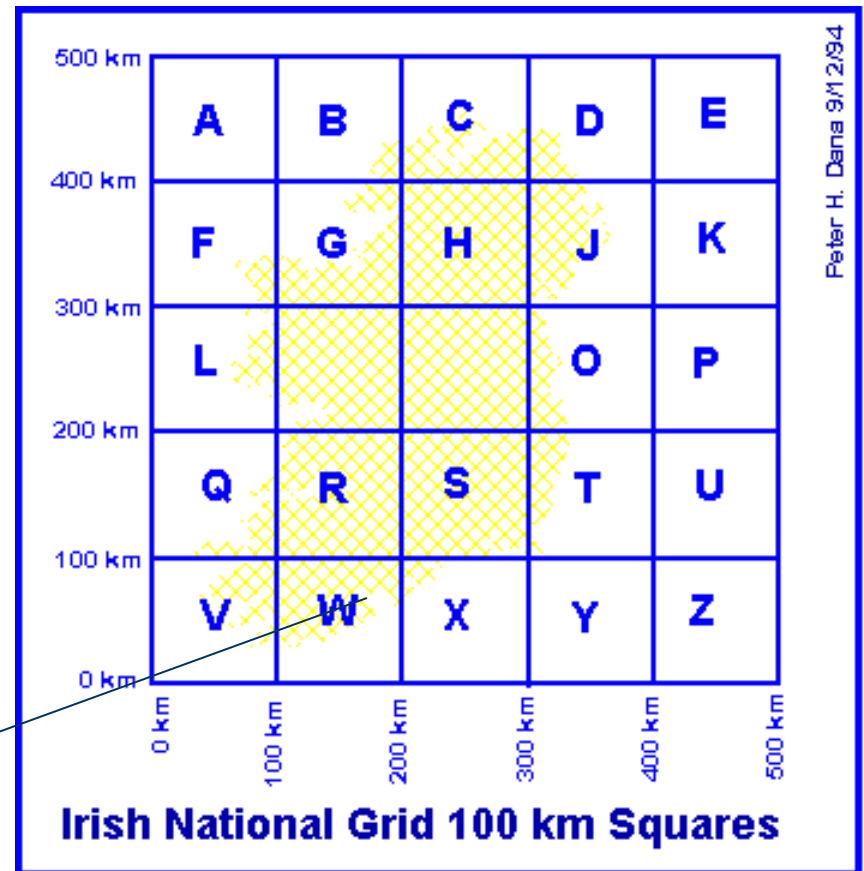
Irish National Grid

IRE65 Latitude and Longitude
53:25:27.66 N 6:15:17.46 W

Irish National Grid
O1600043000

Irish National Grid Example

178711-72641



GIS data types

Data for a GIS comes in three basic forms:

Spatial data—what maps are made of

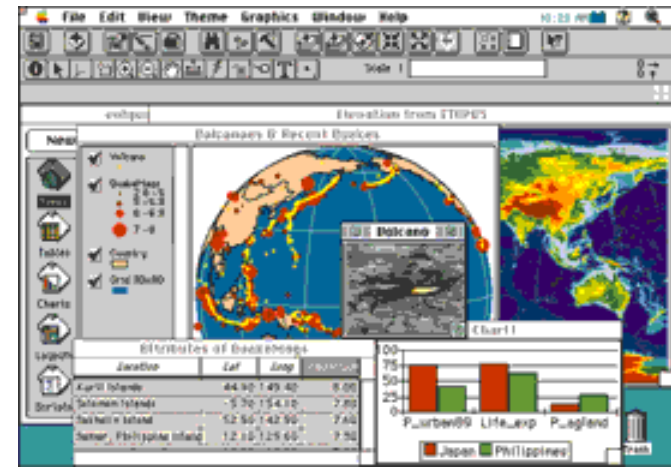
Spatial data, made up of points, lines, and areas, is at the heart of every GIS. Spatial data forms the locations and shapes of map features such as buildings, streets, or cities.

Tabular data—adding information to maps

Tabular data is information describing a map feature. For example, a map of customer locations may be linked to demographic information about those customers.

Image data—using images to build maps

Image data includes such diverse elements as satellite images, aerial photographs, and scanned data—data that's been converted from paper to digital format.



GIS data types

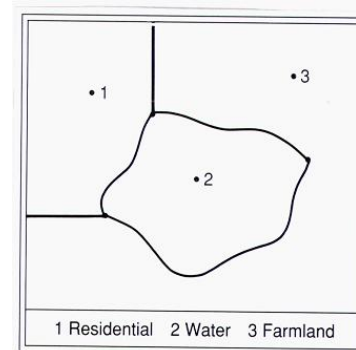
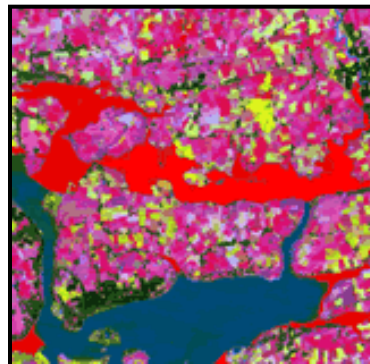
In addition, this data can be further classified into two types of data models:

- **Raster data**

Continuous numeric values, such as elevation, and continuous categories, such as building types, are represented using the raster model.

- **Vector data**

Discrete features, such as customer locations and data summarised by area, are usually represented using the vector model.



GIS data types

Raster

- Information from remote sensing system that has been interpreted by a computer to produce rows of uniform cells coded according to data values. An example would be land cover classification.
- Each cell is called a pixel and has a value. The pixel may represent a spatial area, such as 10m * 10m square.
- Manipulated quickly by computer

1	1	1	3	3	3	3	3	3
1	1	1	3	3	3	3	3	3
1	1	2	2	2	2	3	3	3
1	1	2	2	2	2	2	3	3
1	2	2	2	2	2	3	3	3
3	3	3	2	2	2	3	3	3
3	3	3	3	2	3	3	3	3
3	3	3	3	3	3	3	3	3
1 Residential 2 Water 3 Farmland								

Figure 11. Example of the structure of a raster data file.

GIS data types

Vector

- Vector data is more visually appealing than raster data. It can have the appearance of more traditional hand-drafted maps.
- Vector digital data have been captured as points, lines (a series of point coordinates), or polygons (shapes bounded by lines).
- Database integral part of vector data

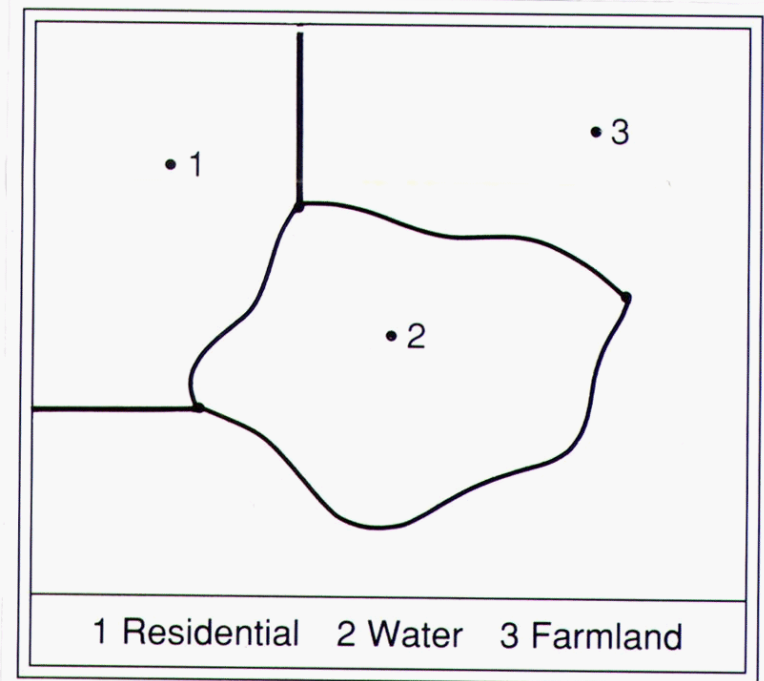
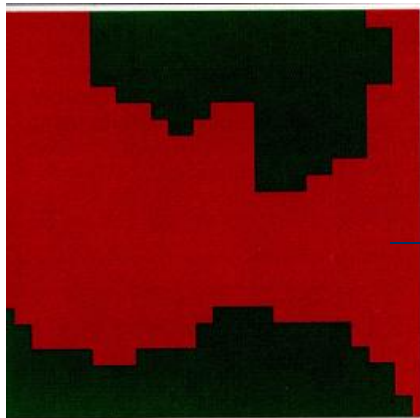
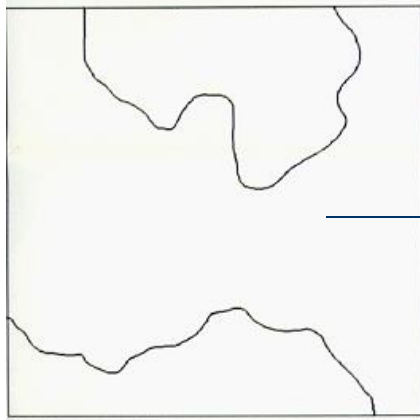


Figure 12. Example of the structure of a vector data file.

Vector & Raster



River



River chemistry

Microsoft Excel - cork_geodir

File Edit View Insert Format Tools Data Window Help Acrobat

100% 10 B I

A1 = BUILDING_I

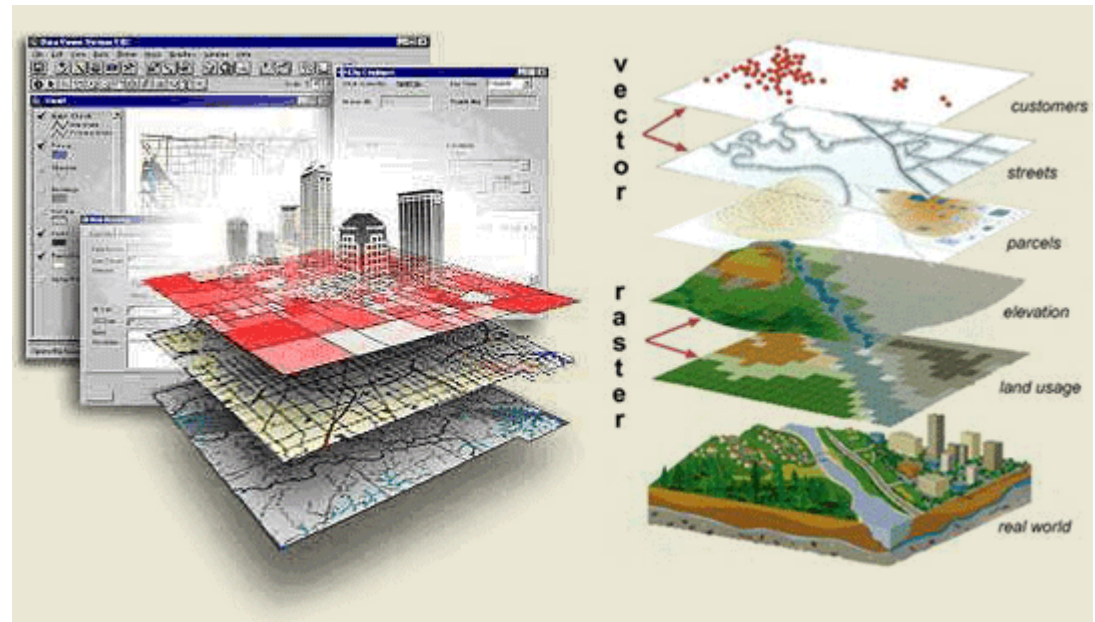
	L	M	N	O	P	Q	R	S	T	U	
1	B	D	V	I	N	U	RESIDENTIA	COMMERCIAL	COUNTY_ID	TLAND_ID	WARD_ID
2	B	N	N	Y	N	0.00000	0.00000	1.00000	43104.00000		
3	N	N	N	N	N	1.00000	0.00000	1.00000	45365.00000		
4	N	N	N	N	N	1.00000	0.00000	1.00000	45365.00000		
5	N	N	N	N	N	1.00000	0.00000	1.00000	45365.00000		
6	N	N	N	N	N	1.00000	0.00000	1.00000	44979.00000		
7	N	N	N	N	N	1.00000	0.00000	1.00000	44979.00000		
8	N	N	N	N	N	1.00000	0.00000	1.00000	44979.00000		
9	N	N	N	N	N	1.00000	0.00000	1.00000	44979.00000		
10	N	N	N	N	N	1.00000	0.00000	1.00000	44979.00000		
11	N	N	N	N	N	1.00000	0.00000	1.00000	44979.00000		
12	N	N	N	N	N	1.00000	0.00000	1.00000	44979.00000		
13	N	N	N	N	N	1.00000	0.00000	1.00000	44979.00000		
14	N	N	N	N	N	1.00000	0.00000	1.00000	44979.00000		
15	N	N	N	N	N	1.00000	0.00000	1.00000	44979.00000		
16	N	N	N	N	N	1.00000	0.00000	1.00000	44979.00000		
17	N	N	N	N	N	1.00000	0.00000	1.00000	44979.00000		
18	N	N	N	N	N	1.00000	0.00000	1.00000	44979.00000		
19	N	N	N	N	N	1.00000	0.00000	1.00000	44979.00000		
20	N	N	N	N	N	1.00000	0.00000	1.00000	44979.00000		
21	N	N	N	N	N	1.00000	0.00000	1.00000	44979.00000		
22	N	N	N	N	N	1.00000	0.00000	1.00000	43742.00000		
23	N	N	N	N	N	0.00000	0.00000	1.00000	42665.00000		
24	N	N	N	N	N	0.00000	0.00000	1.00000	42665.00000		
25	N	N	N	N	N	0.00000	0.00000	1.00000	42665.00000		
26	N	N	N	N	N	0.00000	0.00000	1.00000	42665.00000		
27	N	N	N	N	N	0.00000	0.00000	1.00000	42665.00000		
28	N	N	N	N	N	0.00000	0.00000	1.00000	42665.00000		
29	N	N	N	N	N	0.00000	0.00000	1.00000	42665.00000		
30	N	N	N	N	N	0.00000	0.00000	1.00000	42665.00000		
31	N	N	N	N	N	0.00000	0.00000	1.00000	42665.00000		
32	N	N	N	N	N	0.00000	0.00000	1.00000	42665.00000		
33	N	N	N	N	N	0.00000	0.00000	1.00000	42665.00000		

Ready NUM

Raster or vector?

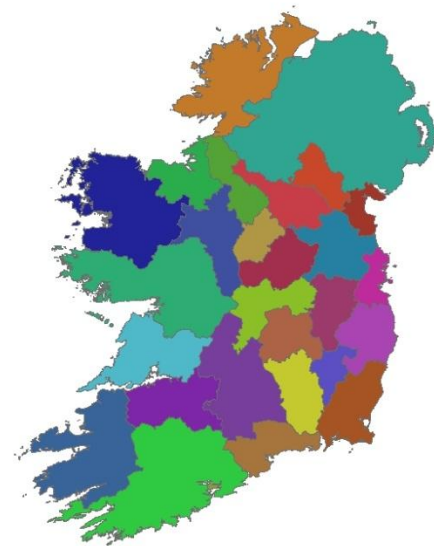
While any feature type can be represented using either model, discrete features, such as customer locations, harbour locations or others, and data summarised by area such as postal code areas or lakes, are usually represented using the vector model.

Continuous categories, such as soil type, rainfall, or elevation, are represented as either vector or raster.



GIS Data Examples

Baseline data such as coastline & counties

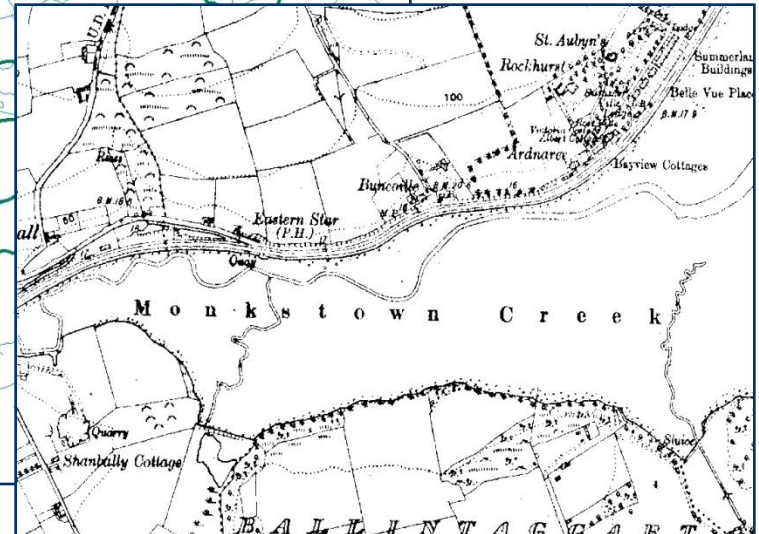
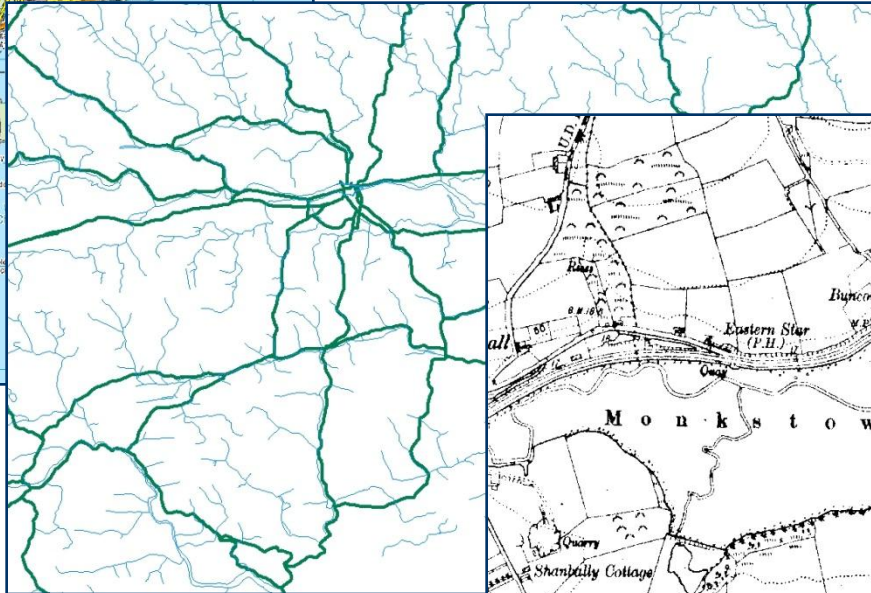


Baseline mapping

1:50,000 raster

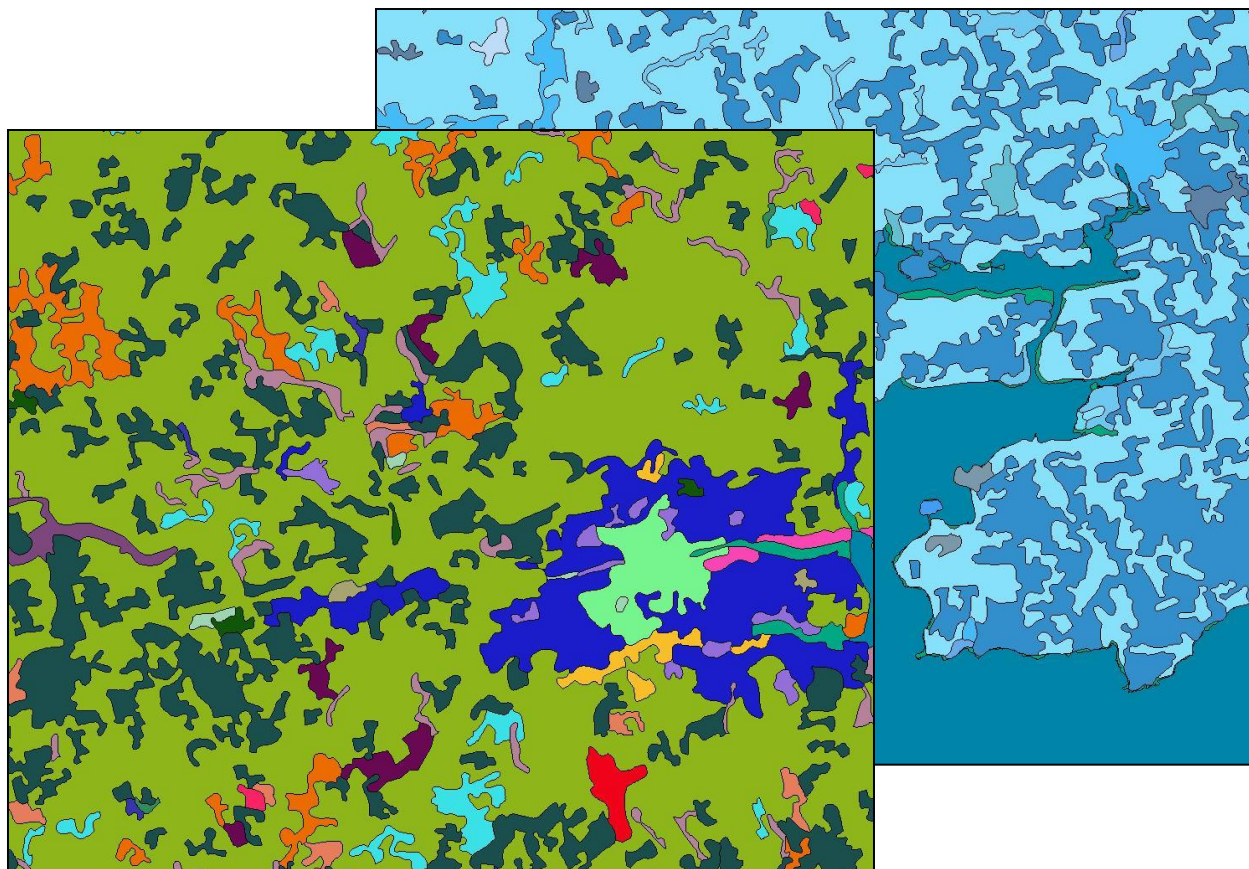
1:50,000 vector

6 inch historical raster



Landcover change

CORINE



Point in time imagery

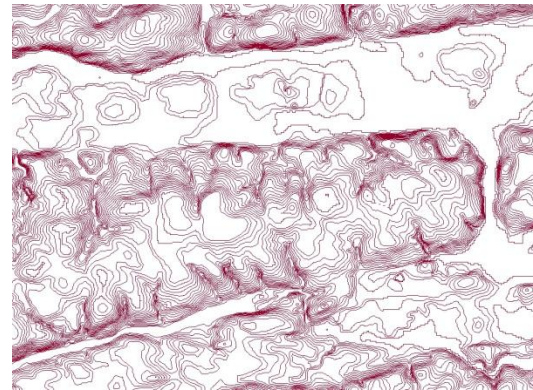
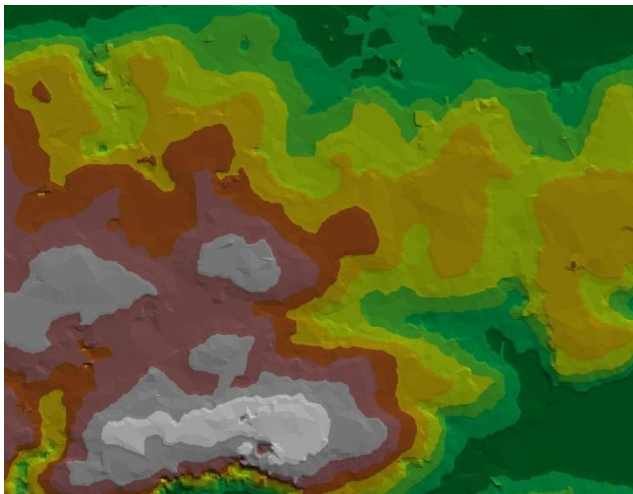
Imagery

- Aerial Photography
- Satellite Imagery



3-D modelling

Digital elevation data, e.g. 10m, 25m & 50m resolutions



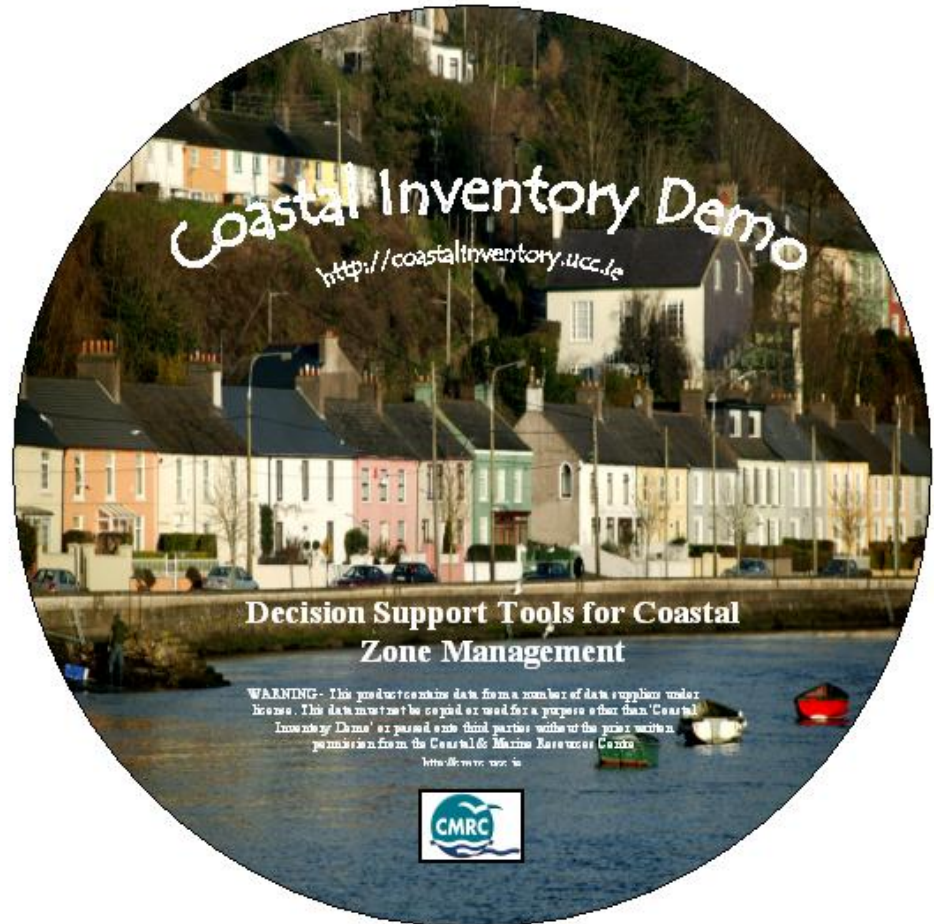
Visualisations



The screenshot shows a window titled 'View4'. Inside the window, there is a list box containing the file 'Killarney.bmp'. To the left of the file name is a small icon of a checkmark inside a square box. The window has a standard Windows-style title bar and a scroll bar on the right side of the list box.

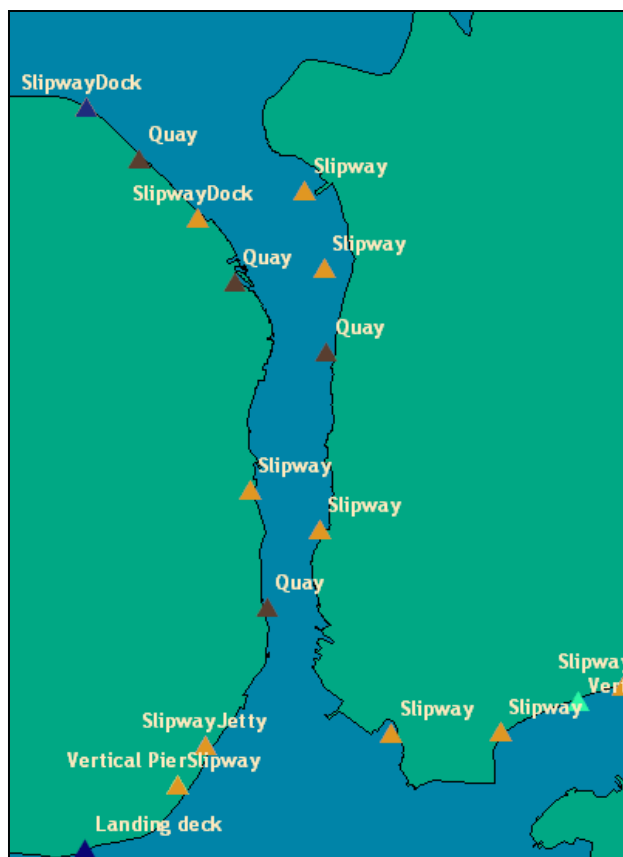
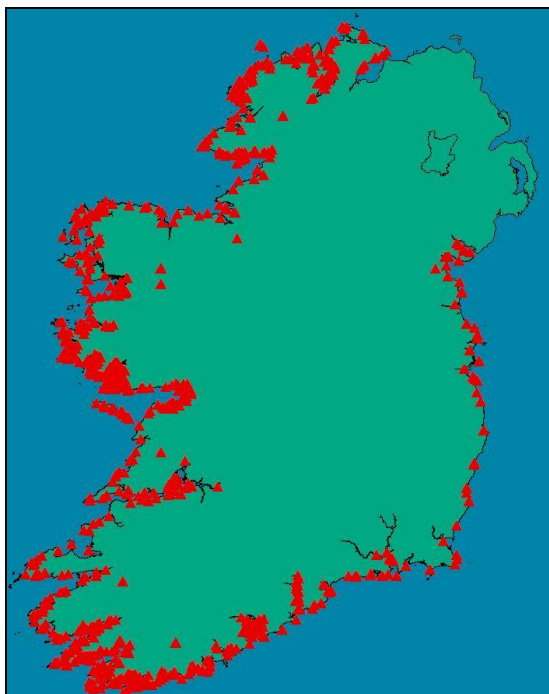
Case Study - Coastal Remote Sensing & GIS

Filling the data gap - generating baseline information



Custom coastal datasets

CMRC Coastal Access Database



Identify Results

Layers: <Visible layers>

Location: (177908.831203 64483.888086)

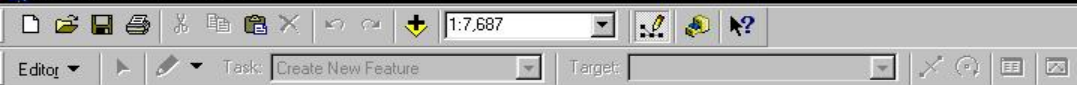
Field	Value
FID	420
Shape	Point
FACILITY_I	377
LOC_ID	269
STRUCT_TYP	Vertical Pier
STRUCT_NOT	L-shaped timber pier, 3 sets of steps. Joined to land by cc
LAND_ACCES	Good.
L_ACCESS_S	0
SEA_ACC1	
SEA_ACC_2	
SEA_ACC_SC	0
DRIES_OUT	Don't know
STATE_OF_R	Timber fair, causeway good. 1 set of steps rotted away.
REPAIR_SCD	2
LENGTH	
WIDTH	
DECK_LEVEL	
BASE_LEVEL	
SLOPE	
SUBSTRATE	
BERTH_LEN1	
BERTH_LEN	
NUM_BERTHS	
USAGE_1	Communications.
USAGE_2	
VALUE_OF_L	
SHELTER_DE	
GENERAL_SH	0
N_SHELTER	0
NE_SHELTER	0
E_SHELTER	0
SE_SHELTER	0
S_SHELTER	0
SW_SHELTER	0
W_SHELTER	0
NW_SHELTER	0
SUGG_IMP_1	
SUGG_IMP_2	
SUGG_IMP_3	
NOTES_1	Concrete and masonry causeway Co. Council property. T
NOTES_2	
NOTES_3	
DATA_SRCE1	The Minister for Agriculture and Fisheries
DATA_SRCE2	
SRCE_DATE1	1972
SRCE_DATE2	
ENTERED_BY	Tom
DATE_ENTER	23/03/99
NAME	Ringskiddy Pier
ADDRESS	Loughbeg
COUNTY	Cork
OWNERSHIP	Cork Co. Co./ Cork Harbour Commissioners

Cork Harbour Pilot Study

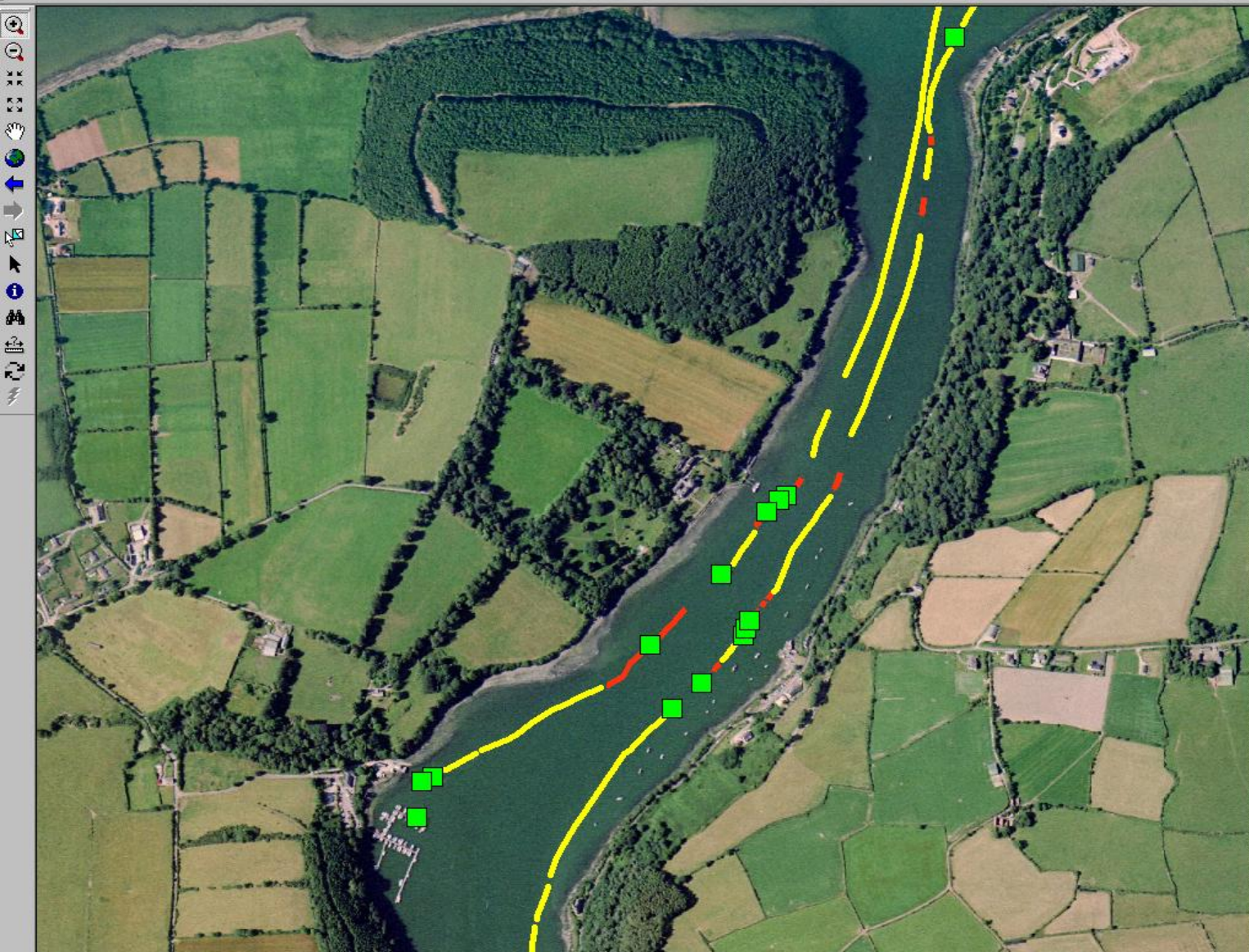


Methods





File Edit View Insert Selection Tools Window Help



- Layers**
- ☒ Embedded
 - ☒ Litholog
 - ☒ Hard_eng
 - ☒ Merge_ship_12_12_03
 - ☒ Merge_lithology_12_12_03
 - type
 - beach/sand shore
 - exposed rocky shore
 - mixed sediment shore
 - sea cliff_rock<10m
 - semi expo_rocky shor
 - sheltered rocky shor
 - ☒ Merge_hard_12_12_03
 - type
 - dump
 - other
 - rock revetments
 - sea wall
 - wall-other
 - ☒ Merge_embed_12_12_03
 - jetty (non solid)
 - ladder
 - other
 - pier (solid)
 - steps
 - slipway
 - ☐ Rivers
 - ☐ Duchas
 - ☐ CAD
 - ☐ Admiralty Vector
 - ☐ Admiralty Rasters
 - ☐ cork_geodir
 - ☐ ortho2000
 - ☐ ortho1995
 - ☐ 9in_70s_photos
 - ☐ 6 inch

Display Source

Spatial Analyst Layer: w164rect.ers

186639.60 69212.52 Meters

Natural Shoreline Type



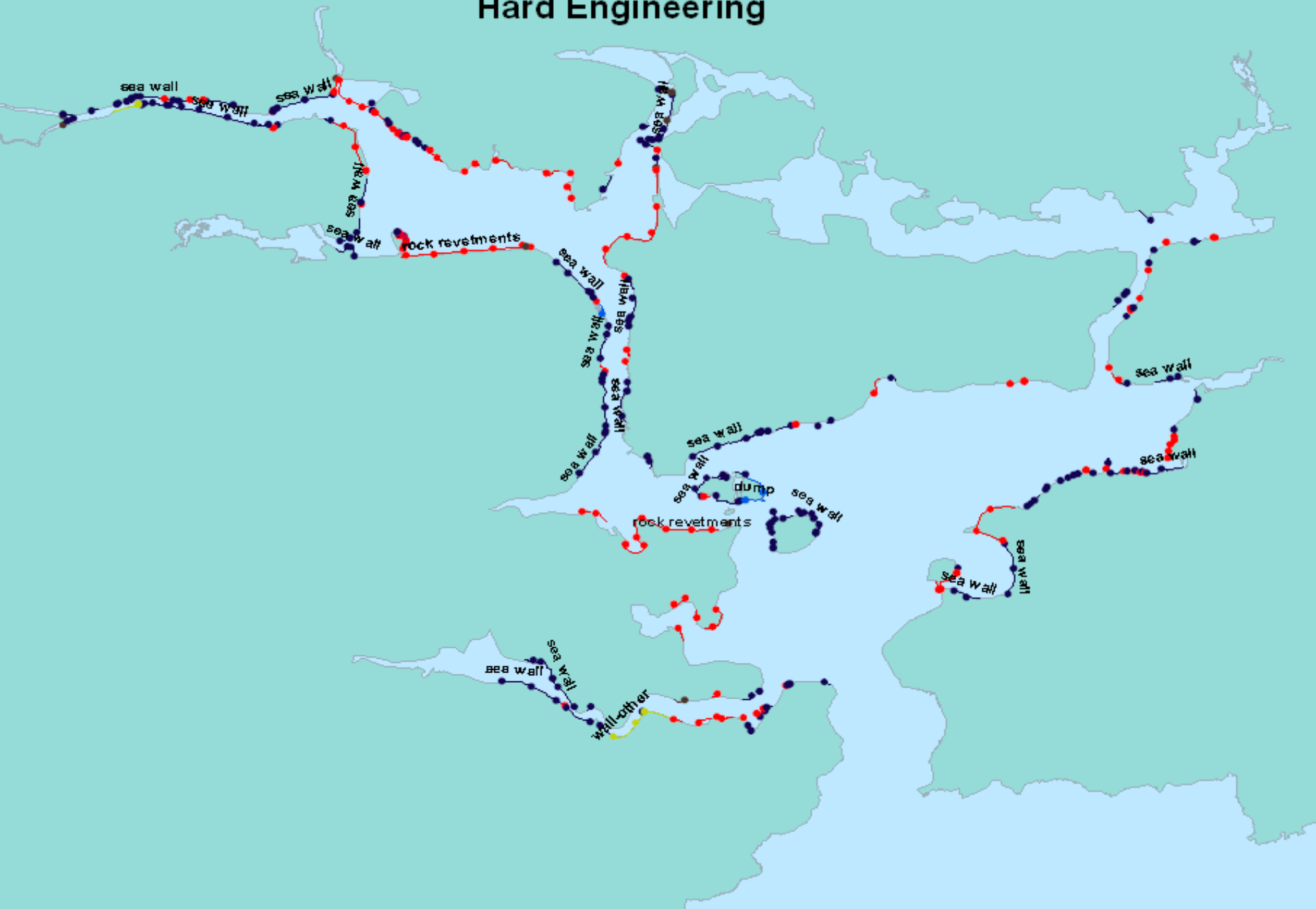
other

other

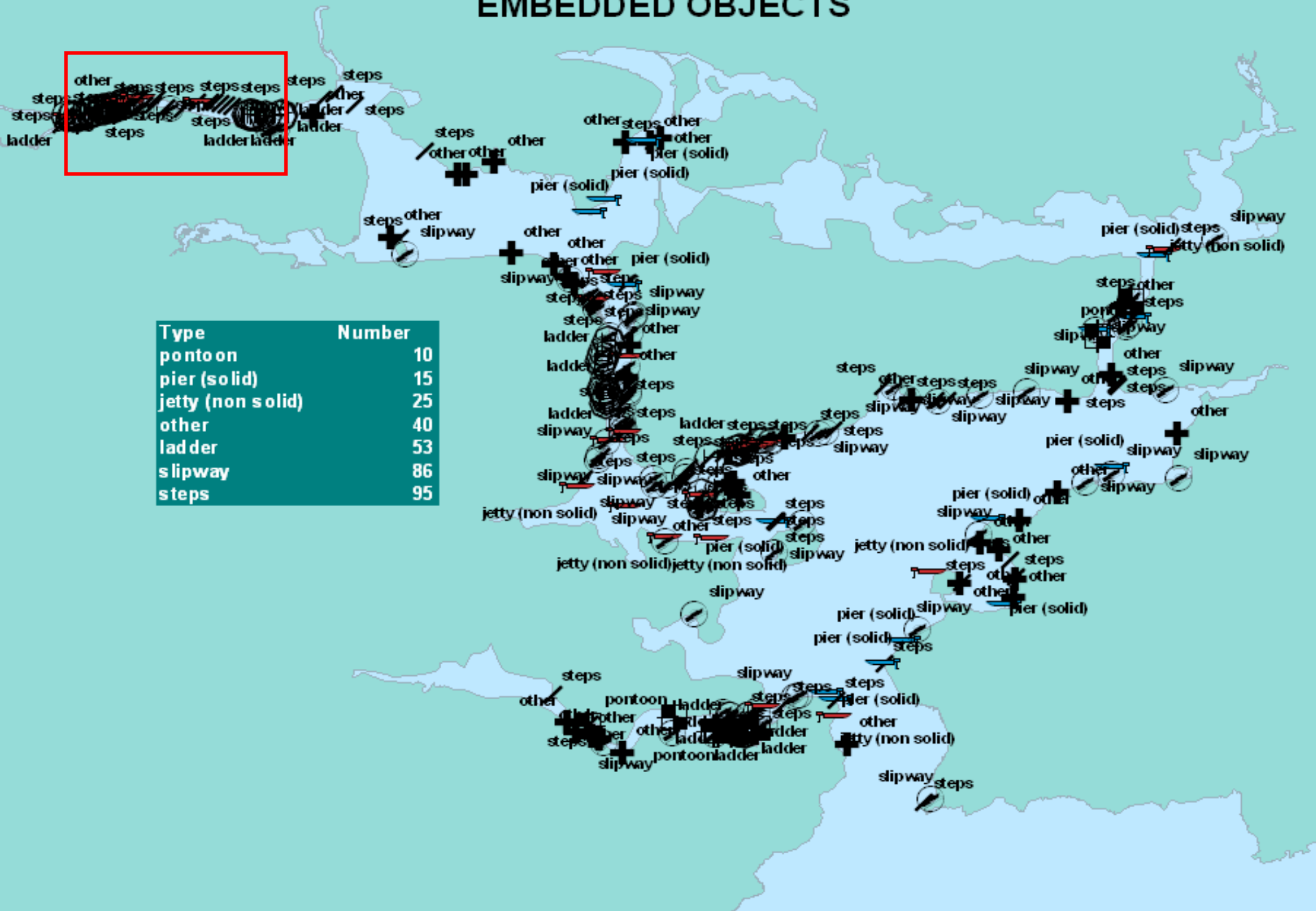
other

other

Hard Engineering



EMBEDDED OBJECTS







jetty (non solid)

sheltered rocky shore

mixed sediment shore

sheltered rocky shore

rock revetments

step

other

mixed sediment shore

sea wall

slipway

sheltered rocky shore

pier (solid)

slipway

other

rock revetments

other

steps

other

steps

other

pier (solid)

sea wall

mixed sediment shore

sea wall

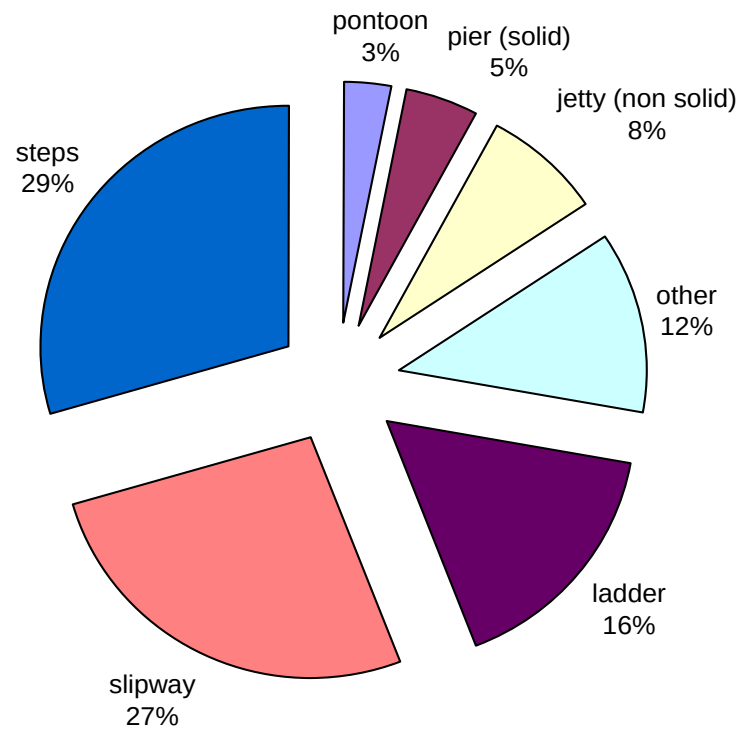
sea wall

sea wall

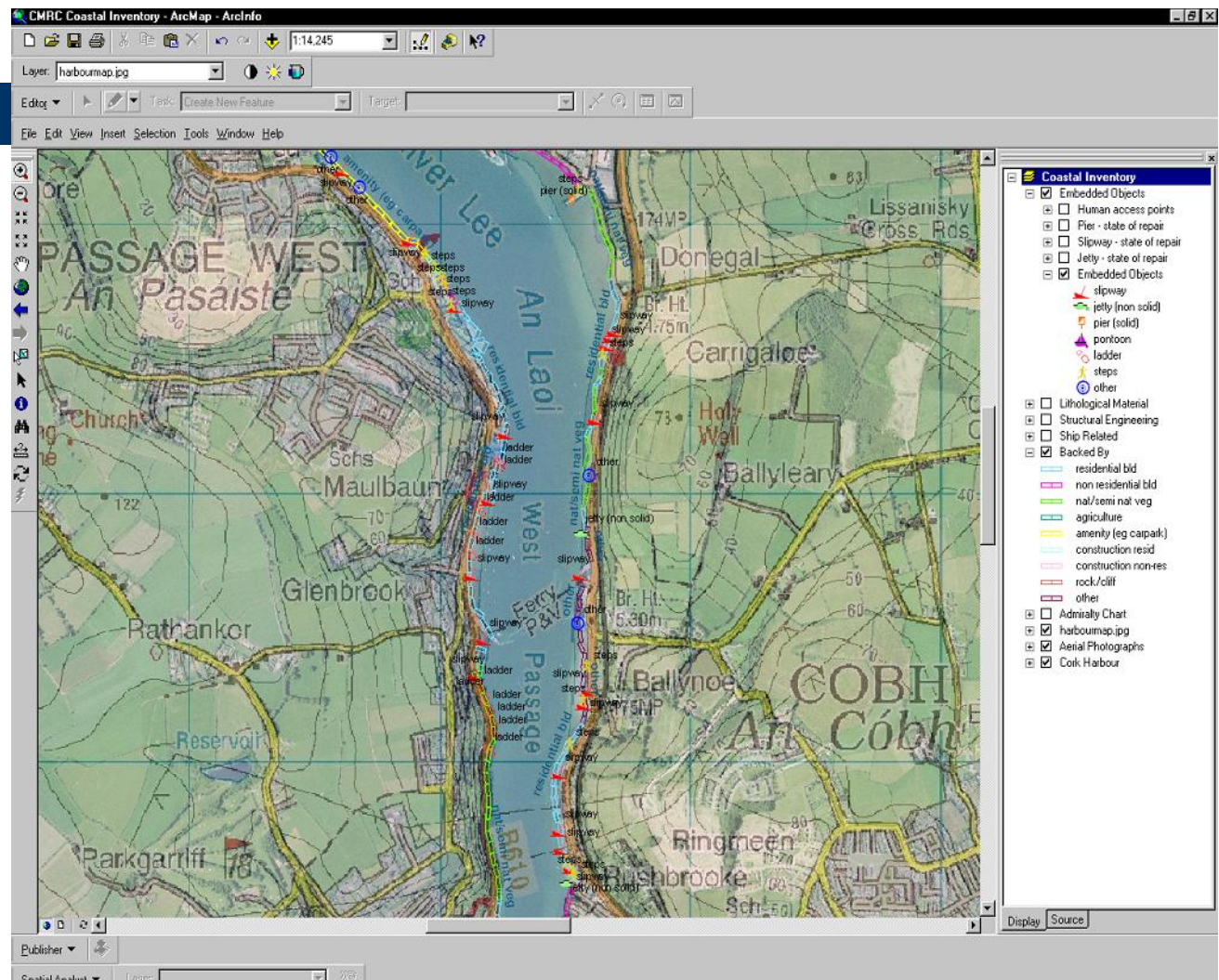


End user visualisation - Statistics

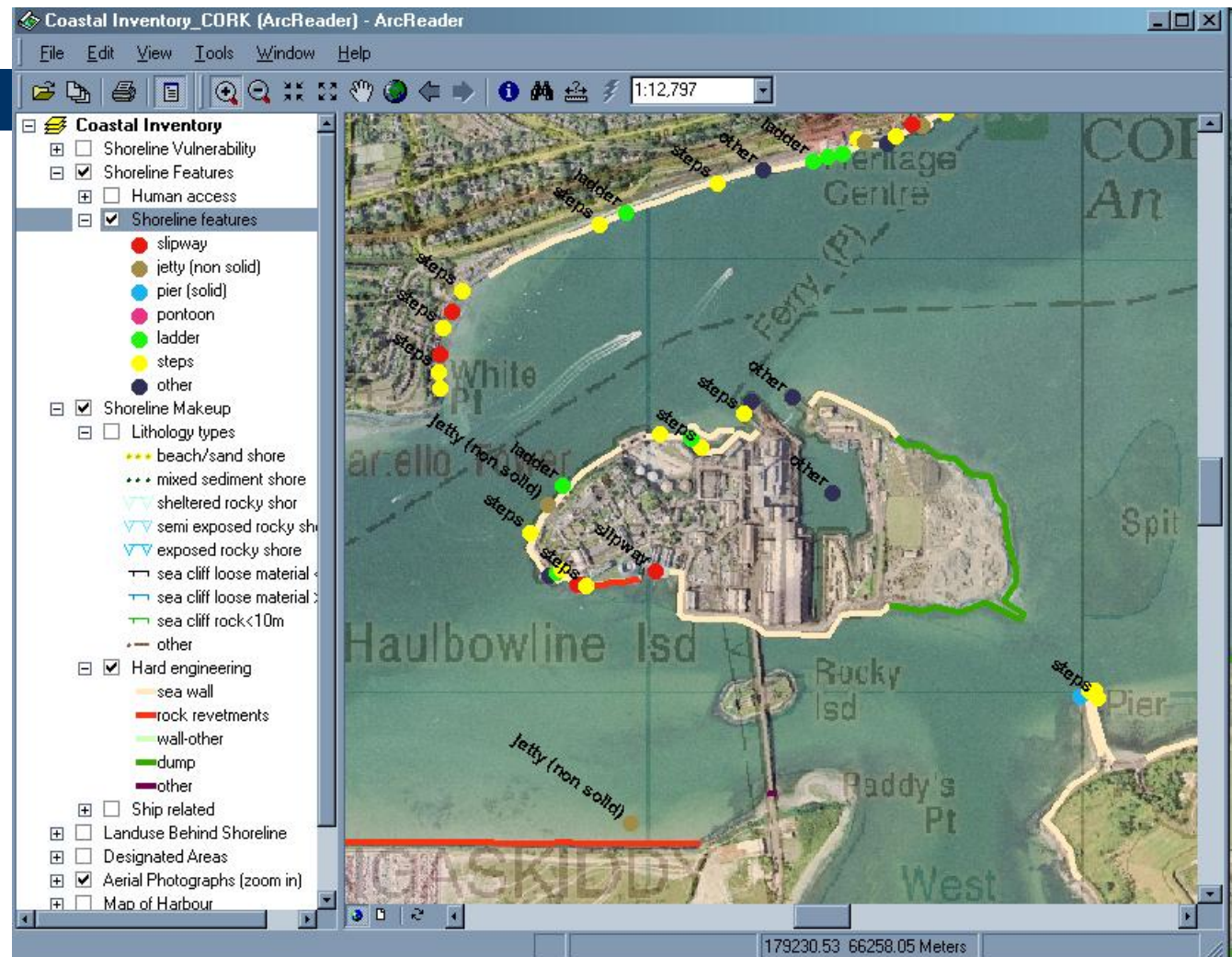
Embedded Objects



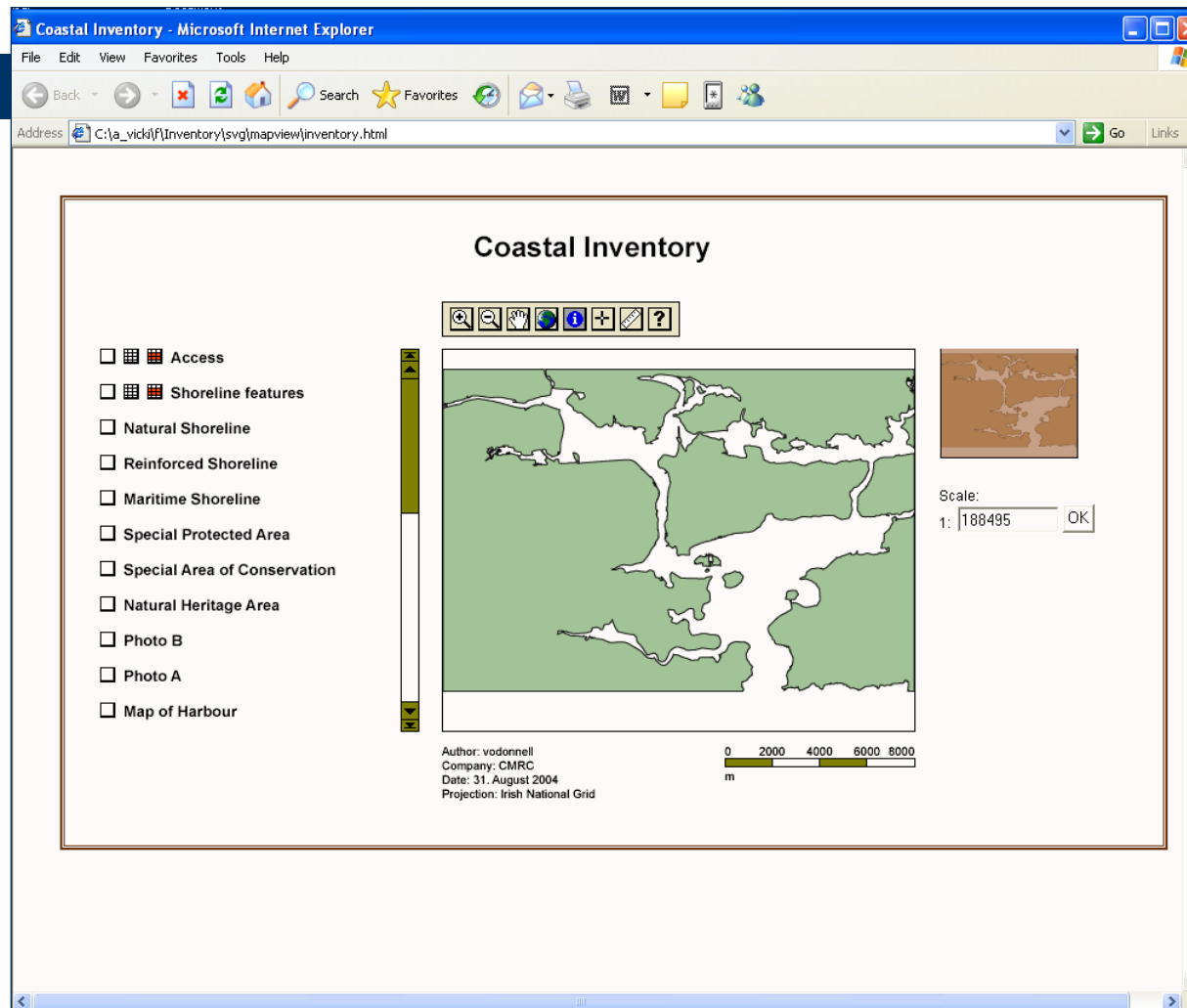
End user visualisation- Fully functional GIS



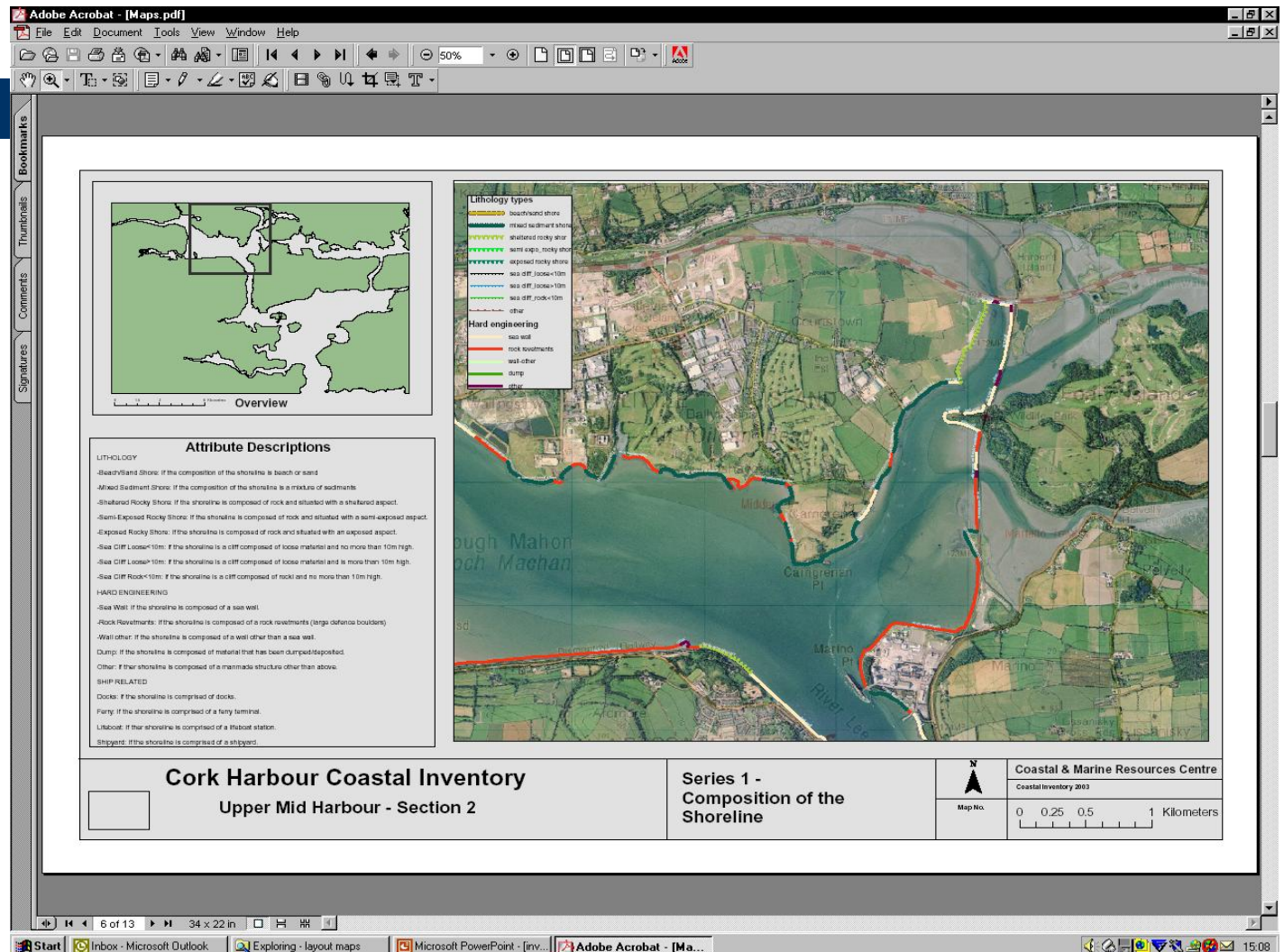
End user visualisation- Free GIS Software



End user visualisation- Web-enabled GIS

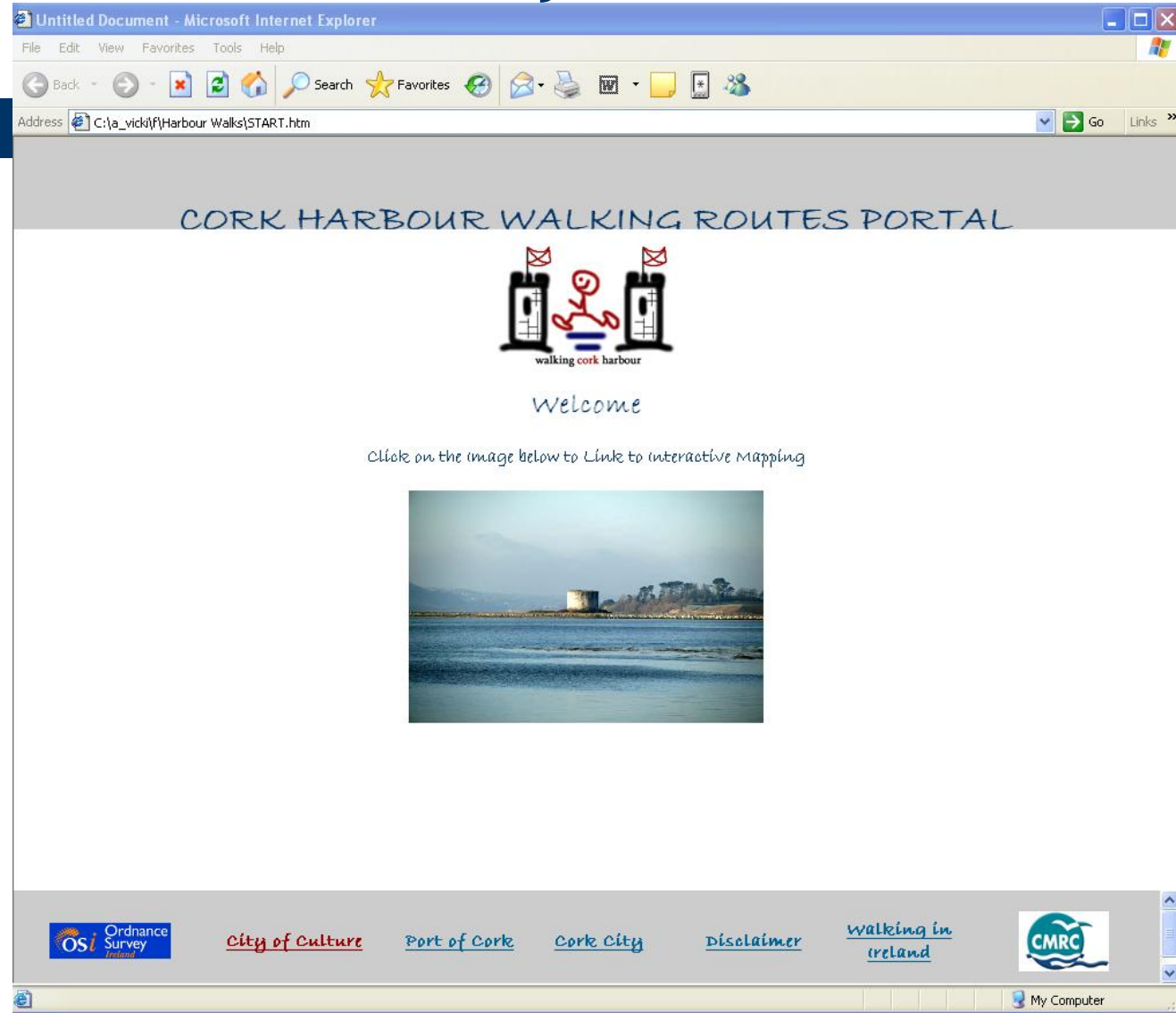


End user visualisation - Static Maps e.g. PDF



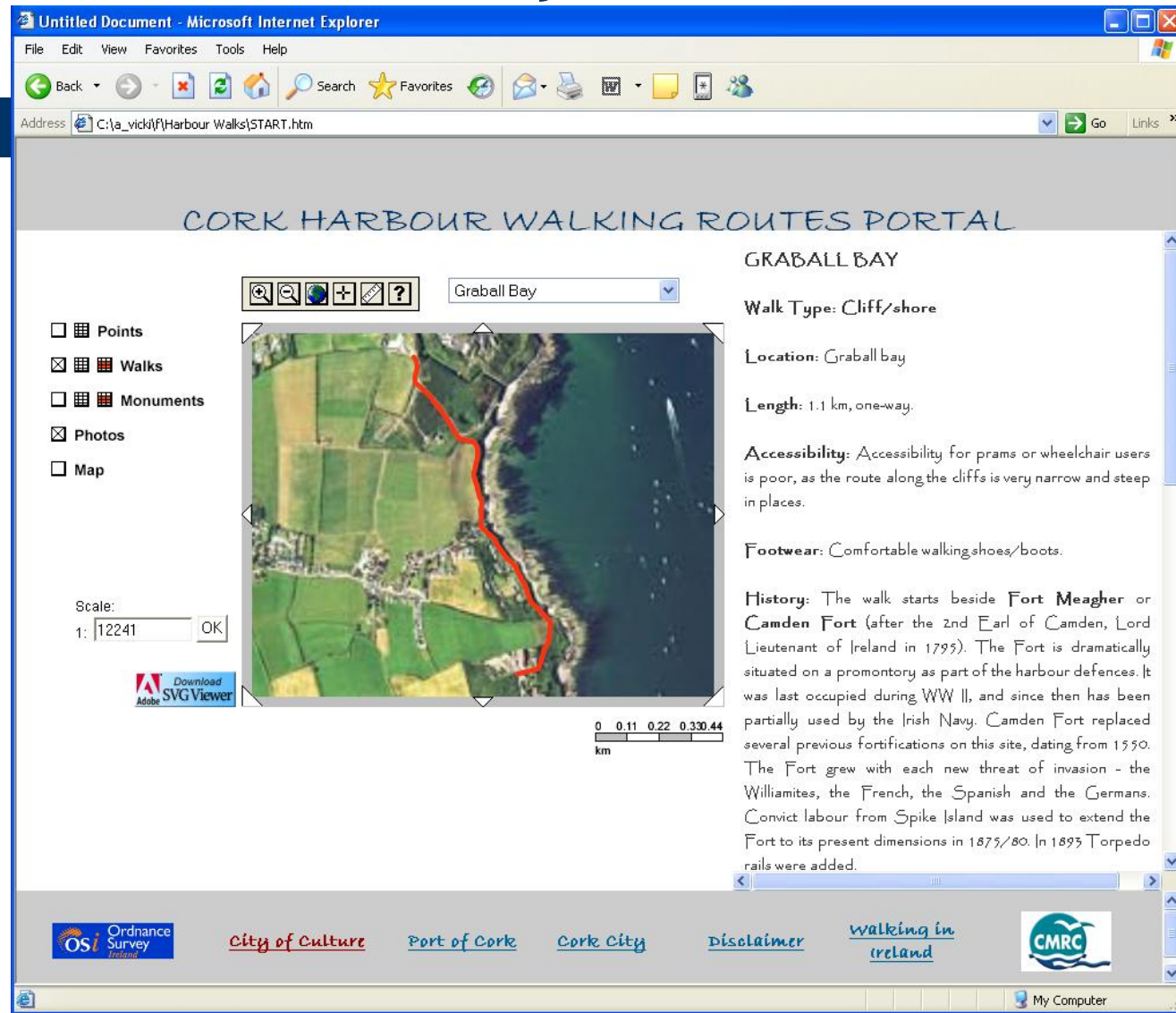
End user visualisation - Community websites

Portal to links
and GIS



End user visualisation - Community websites

Web-enabled
GIS with
photographs,
information
on heritage
and where to
walk, park,
walking route
surface type
etc.



Untitled Document - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites RSS Print Mail Print Mail RSS Print Mail

Address [C:\a_vicki\F\Harbour Walks\START.htm](C:\a_vicki\F\Harbour Walks\START.htm) Go Links

CORK HARBOUR WALKING ROUTES PORTAL

Graball Bay

- ☐ Points
- ☒ Walks
- ☐ Monuments
- ☒ Photos
- ☐ Map

Scale: 1: 12241 OK

Download SVG Viewer

0 0.11 0.22 0.33044 km

GRABALL BAY

Walk Type: Cliff/shore

Location: Graball bay

Length: 1.1 km, one-way.

Accessibility: Accessibility for prams or wheelchair users is poor, as the route along the cliffs is very narrow and steep in places.

Footwear: Comfortable walking shoes/boots.

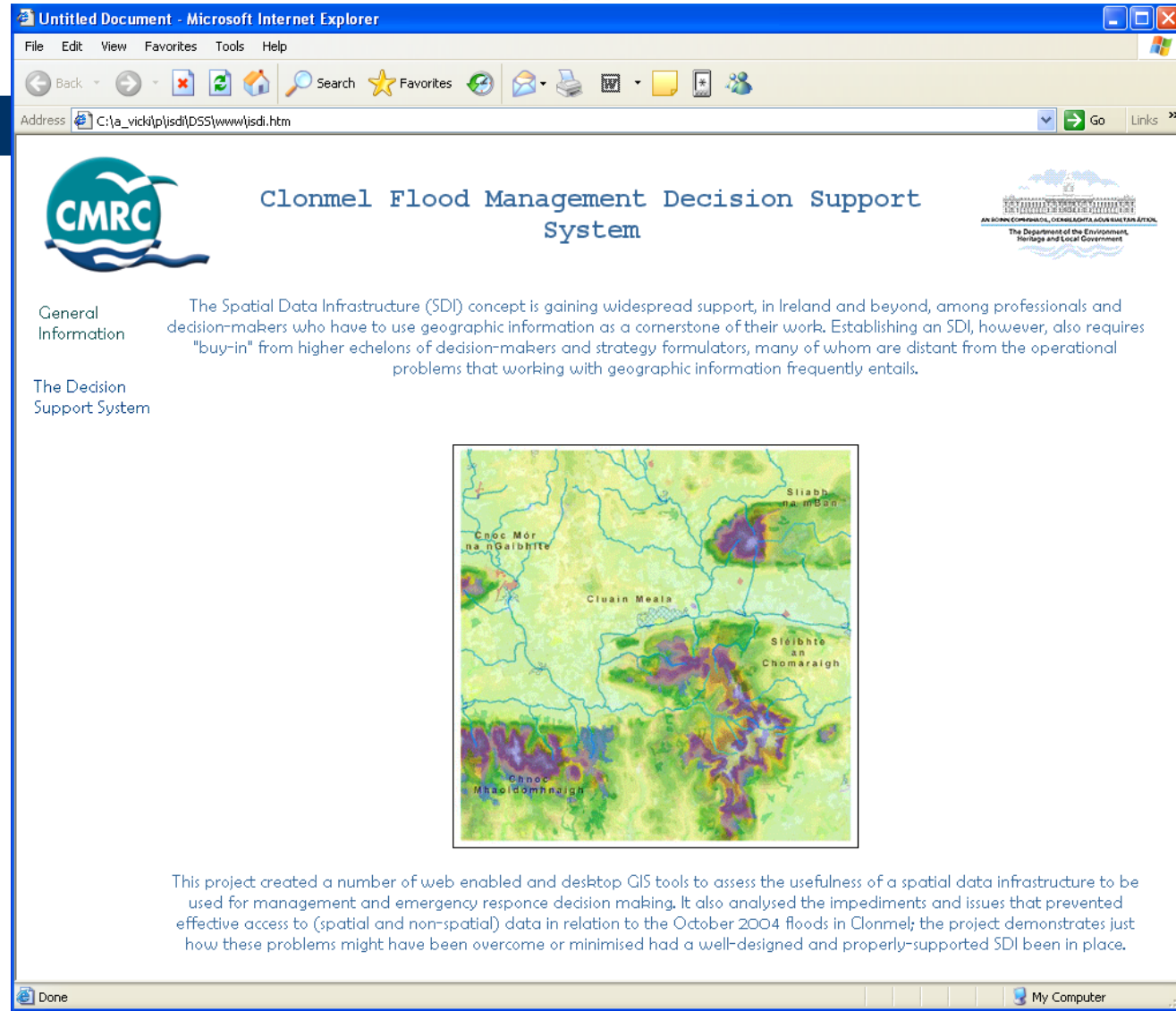
History: The walk starts beside **Fort Meagher** or **Camden Fort** (after the 2nd Earl of Camden, Lord Lieutenant of Ireland in 1795). The Fort is dramatically situated on a promontory as part of the harbour defences. It was last occupied during WW II, and since then has been partially used by the Irish Navy. Camden Fort replaced several previous fortifications on this site, dating from 1550. The Fort grew with each new threat of invasion - the Williamites, the French, the Spanish and the Germans. Convict labour from Spike Island was used to extend the Fort to its present dimensions in 1875/80. In 1895 Torpedo rails were added.

OS Ordnance Survey Ireland City of Culture Port of Cork Cork City Disclaimer walking in Ireland CMRC

My Computer

End user visualisation - Decision Support Systems

Portal

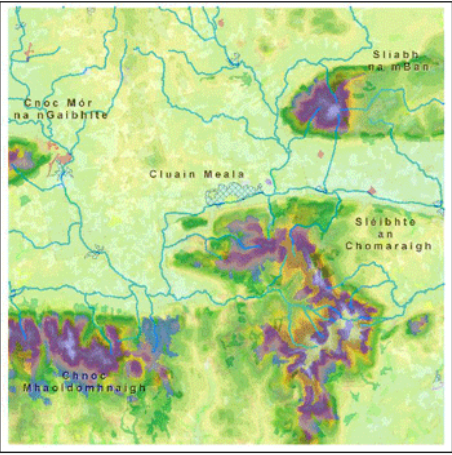


The screenshot shows a web browser window titled "Untitled Document - Microsoft Internet Explorer". The address bar displays "C:\a_vicki\p\jsdi\DSS\www\jsdi.htm". The page content includes the CMRC logo, the title "Clonmel Flood Management Decision Support System", and a paragraph about the Spatial Data Infrastructure (SDI) concept. A map of the Clonmel area is shown, with labels for "Cnoc Mór na nGaibhte", "Cluain Meala", "Sliabh na mBonn", "Sliabh an Chomaraigh", and "Cnoc Mhaoldomhnaigh". The map uses a color scale to represent elevation or flood risk. The page also includes a sidebar with links to "General Information" and "The Decision Support System".

General Information

The Decision Support System

The Spatial Data Infrastructure (SDI) concept is gaining widespread support, in Ireland and beyond, among professionals and decision-makers who have to use geographic information as a cornerstone of their work. Establishing an SDI, however, also requires "buy-in" from higher echelons of decision-makers and strategy formulators, many of whom are distant from the operational problems that working with geographic information frequently entails.



This project created a number of web enabled and desktop GIS tools to assess the usefulness of a spatial data infrastructure to be used for management and emergency response decision making. It also analysed the impediments and issues that prevented effective access to (spatial and non-spatial) data in relation to the October 2004 floods in Clonmel; the project demonstrates just how these problems might have been overcome or minimised had a well-designed and properly-supported SDI been in place.

End user visualisation - Decision Support Systems

Links to documents

Untitled Document - Microsoft Internet Explorer

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Back Forward Stop Home Search Favorites Print Mail News RSS Feeds

Address C:\a_vicki\p\jsdi\DSS\www\jsdi.htm Go Links



Clonmel Flood Management Decision Support System



General Information

The Decision Support System

FLOOD EMERGENCY RESPONSE PLAN

This document set out the procedure for responding to an emergency flooding event.

Following an increase in the occurrences of flooding a Flood Contingency Plan has been developed that brings together various emergency services.

The Plan reviews and updates the procedures for responding to flooding. The Plan includes input from, and reference to, representatives from the County and Borough Council, An Garda Síochána, Defence Forces, Civil Defence and the South Eastern Health, Board Fire Service, Red Cross, Nights of Malta, S.E.M.R.A., other voluntary groups and media.

DEFINITION

A major event is where weather conditions deteriorate to the extent that flooding of water courses occur which could cause or threaten:

- (a) Death or injury.
- (b) Serious disruption of essential services
- (c) Damage to property and where such occurrences would require the assistance of all emergency services

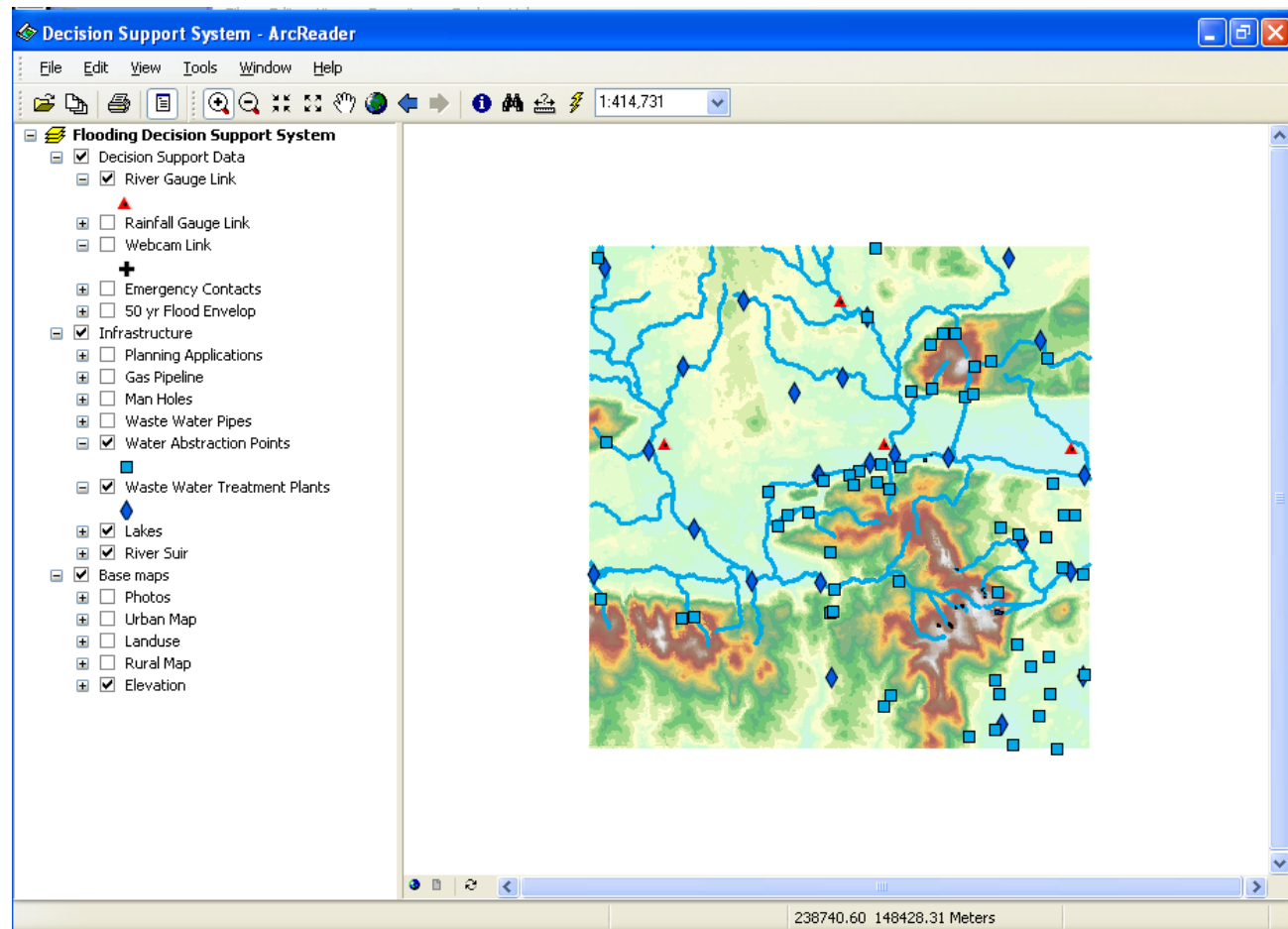
Username

Password

Done My Computer

End user visualisation - Decision Support Systems

Desktop GIS
on free
distributable
software



End user visualisation - Decision Support Systems

Web-enabled
GIS with live
data streams
Accessible via
PDAs etc..



Untitled Document - Microsoft Internet Explorer

File Edit View Favorites Tools Help

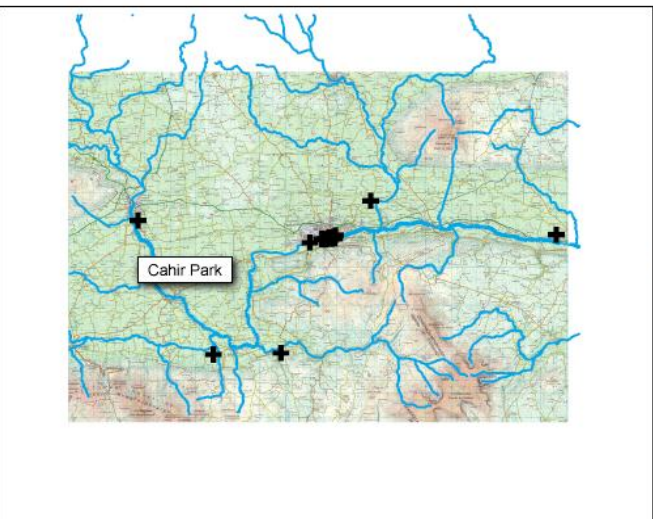
Back Forward Stop Home Search Favorites RSS Feeds Print Mail

Address C:\a_vicki\p\jsdl\DSS\webgis\all.htm

Flooding Decision Support System

☐ emergency information
☒ live webcams
☒ 50 yr flood envelop
☐ rainfall gauges
☐ river gauges
☒ river suir
☒ Rural Map

Zoom to ...



Cahir Park

Scale: 1: 388231 OK

Download SVG Viewer

0 10000 20000 m



Webcam

Metadata:

[Identification Information](#)
[Data Quality Information](#)
[Spatial Data Organization Information](#)
[Spatial Reference Information](#)
[Entity and Attribute Information](#)
[Distribution Information](#)
[Metadata Reference Information](#)

Identification Information:
Citation:
Citation Information:
Originator: Vicki O'Donnell
Publication Date: 2005
Title: webcam
Geospatial Data Presentation Form
vector digital data
Online Linkage:
\\CMRC91
C:\a_vicki\p\projects\isdl\dss\dat
Description:

javascript:showWindow1('th1/file11.jpg','metadata/webcam.html','MapViewSVG','location=yes,menubar=yes,resizable=yes,scrollbars=y

My Computer

Independent Study

- Using examples: construct a table noting 5 examples of how GIS could be useful in your course.
- What are the pros and cons of GIS for the construction industry? (Point form)
- In what ways is it a useful tool/method for dissertations? (Point form)

