

# STRATEGIC ECOLOGICAL ASSESSMENT OF COMAH SITES

Timothy Moffat and Peter Hankard

## Introduction

The Countryside Information System (CIS) was developed to provide policy advisors with easy access to strategic information at national scales about the British countryside. However, European and British legislation, particularly relating to industrial activities, is increasingly requiring policy- and decision-makers to consider environmental issues at more localised scales. The case study demonstrates the potential application of CIS in providing operators and regulators of industrial or commercial sites covered by European and national legislation on the control of major accidents with environmental information that can be taken into account in assessing hazards and risks to the environment from an accident at such sites.

## The Policy Framework

The Control of Major Accident Hazards Regulations 1999 (the COMAH Regulations), implementing the 1996 Seveso II Directive, aim to prevent major industrial accidents involving dangerous substances and to limit the consequences to people and the environment of any which do occur. They apply to specific establishments at which dangerous substances are present in quantities equal to or exceeding threshold amounts defined in the Regulations. Operators of establishments subject to the COMAH Regulations are required to demonstrate that they have identified potential major accident hazards on their sites and taken sufficient steps to prevent their occurrence and to limit their consequences to people and the environment.

The COMAH Regulations replace the previous Control of Industrial Major Accident Hazards (CIMAH) Regulations 1984 which implemented the 1982 Seveso Directive. The revision has introduced greater emphasis on environmental protection into the legislation, as well as reinforcing the previous commitment to protect human health and property. This is reflected in the competent authority specified for the new Regulations, which is jointly the Environment Agency and the Health and Safety Executive (HSE) in England and Wales and the Scottish Environment Protection Agency (SEPA) and HSE in Scotland.

The Regulations impose more stringent requirements on the operators of establishments that store or use larger quantities of dangerous substances. Operators of these “Top Tier” sites are required to prepare and submit a written safety report to the competent authority, prepare an on-site emergency plan and issue safety information to the public. Operators of Top Tier sites are required to provide information concerning the environment on and around their establishments within their safety reports. Local authorities are required to draw up an off-site emergency plan for each Top Tier site within their area.

The COMAH Regulations came into force as recently as 1 April 1999 and, as such, many of the deadlines for the submission of new information under the Regulations have not yet elapsed. Information concerning the number of COMAH Top Tier sites in Great Britain is, therefore, not yet available. Thus, in order to demonstrate the potential use of CIS in helping operators gather environmental information, this case study uses data submitted by operators to the then competent authority (HSE) under the CIMAH Regulations.

Published guidance concerning the requirements of the COMAH Regulations is available and is listed in the ‘Further Reading’ section at the end of this case study.

## Data Sources

For the case study, the regional offices of the HSE provided information on the location of the Top Tier CIMAH Sites in Great Britain (but excluding sites occupied by the Ministry of Defence). This site information can be aggregated into a suitable CIS format. Figure 1 shows the distribution of some 302 x 1km squares occupied by these sites (CIMAH Squares) and Table 1 gives the number of the sites by main processes (as at 1994).

Table 1. Processes and Numbers of Top Tier CIMAH Sites in Great Britain

| <b>Process</b>                         | <b>No. of Sites</b> |
|--|---------------------|
| Gas Storage and Filling                | 97                  |
| Chemical Manufacture and Processing    | 95                  |
| Oil and Petroleum Storage and Refining | 42                  |
| Water Treatment                        | 16                  |
| Warehousing and Storage                | 16                  |
| Timber Treatment                       | 21                  |
| Miscellaneous                          | 15                  |

Top Tier CIMAH Sites are present in nearly every county of Great Britain (see Table 2). Only Bedfordshire, Cornwall, Hertfordshire, Isle of Wight, Isle of Man, Northumberland and Wiltshire in England, Powys in Wales and the Borders and Tayside in Scotland do not have sites within them. However, the CIMAH Squares are not evenly distributed throughout the country; there are 23 CIMAH Squares each in Cheshire and Humberside and 20 CIMAH Squares each in Cleveland and Greater London. Fifteen counties, such as Orkney and Shetland only have one CIMAH Square. In terms of the density of CIMAH Squares relative to the land area or size of the counties, Cleveland has the largest concentration with over 3 per cent of the kilometre squares comprising the county having a Top Tier CIMAH site within them. Cheshire, Merseyside and Greater London have Top Tier CIMAH sites in about 1 per cent of their respective land areas.

Assessing the environment round the CIMAH Sites requires access to a range of environmental data, such as the extent of urban and built-up areas, the distribution of other land cover and habitats, and the distribution of designated areas. Much of these data are already available in computerised form and in CIS. The Land Cover Map of Great Britain (LCMGB) derived from satellite imagery, and the Ordnance Survey’s 1995 digital 1:250,000 Strategi data, both customised for use in CIS, provide information on the extent of different land cover types and geographical reference attributes, like urban and suburban areas. Several government departments and agencies provide data describing designated areas, such as Sites of Special Scientific Interest (SSSIs) and Areas of Outstanding Natural Beauty (AONBs). English Nature (EN), Scottish Natural Heritage (SNH), the Countryside Council for Wales (CCW), the Countryside Commission (now the Countryside Agency) and the Farming and Rural Conservation Agency (FRCA) provide various data sets in CIS format.



Figure 1. Distribution of the 302 Top Tier CIMAH Squares in Great Britain

Table 2. Distribution of Top Tier CIMA Sites by County in Great Britain.

| County            | Squares/Sites | Density % | County           | Squares/Sites | Density % |
|-------------------|---------------|-----------|------------------|---------------|-----------|
| ENGLAND           |               |           | WALES            |               |           |
| Avon              | 8             | 0.58      | Clwyd            | 6             | 0.24      |
| Buckinghamshire   | 2             | 0.11      | Dyfed            | 6             | 0.10      |
| Berkshire         | 1             | 0.08      | Gwent            | 2             | 0.14      |
| Bedfordshire      |               |           | Gwynedd          | 1             | 0.02      |
| Cambridgeshire    | 3             | 0.09      | Mid Glamorgan    | 1             | 0.10      |
| Cheshire          | 23            | 0.97      | Powys            |               |           |
| Cleveland         | 20            | 3.14      | South Glamorgan  | 5             | 1.10      |
| Cornwall          |               |           | West Glamorgan   | 6             | 0.67      |
| Cumbria           | 4             | 0.06      |                  |               |           |
| Derbyshire        | 9             | 0.34      | SCOTLAND         |               |           |
| Devon             | 1             | 0.01      | Borders          |               |           |
| Dorset            | 1             | 0.04      | Central          | 9             | 0.33      |
| Durham            | 2             | 0.08      | Dumfries & Gall. | 1             | 0.02      |
| Essex             | 11            | 0.29      | Fife             | 3             | 0.21      |
| Gloucestershire   | 3             | 0.11      | Grampian         | 4             | 0.04      |
| Gtr Manchester    | 11            | 0.86      | Highland         | 1             | <0.01     |
| Hampshire         | 8             | 0.21      | Lothian          | 2             | 0.11      |
| Hereford & Worcs. | 5             | 0.13      | Orkney           | 1             | 0.06      |
| Hertfordshire     |               |           | Shetland         | 1             | 0.05      |
| Humberside        | 23            | 0.63      | Strathclyde      | 6             | 0.04      |
| Isle of Wight     |               |           | Tayside          |               |           |
| Kent              | 5             | 0.13      | Western Isles    | 1             | 0.02      |
| Lancashire        | 3             | 0.10      |                  |               |           |
| Leicestershire    | 6             | 0.24      | Isle of Man      |               |           |
| Lincolnshire      | 4             | 0.07      |                  |               |           |
| Gtr London        | 20            | 1.24      |                  |               |           |
| Merseyside        | 10            | 1.39      |                  |               |           |
| Norfolk           | 7             | 0.13      |                  |               |           |
| Northamptonshire  | 1             | 0.04      |                  |               |           |
| Northumberland    |               |           |                  |               |           |
| Nottinghamshire   | 1             | 0.05      |                  |               |           |
| Oxfordshire       | 2             | 0.08      |                  |               |           |
| Shropshire        | 6             | 0.17      |                  |               |           |
| Somerset          | 2             | 0.06      |                  |               |           |
| Staffordshire     | 2             | 0.07      |                  |               |           |
| Suffolk           | 7             | 0.18      |                  |               |           |
| Surrey            | 2             | 0.12      |                  |               |           |
| East Sussex       | 1             | 0.05      |                  |               |           |
| West Sussex       | 1             | 0.05      |                  |               |           |
| Tyne & Wear       | 4             | 0.69      |                  |               |           |
| Warwickshire      | 1             | 0.05      |                  |               |           |
| West Midlands     | 8             | 0.89      |                  |               |           |
| Wiltshire         |               |           |                  |               |           |
| North Yorkshire   | 2             | 0.02      |                  |               |           |
| South Yorkshire   | 6             | 0.39      |                  |               |           |
| West Yorkshire    | 10            | 0.49      |                  |               |           |

## The Environment around CIMAH Sites

The proximity of CIMAH sites to built-up areas is an important consideration not least for assessing risks to human health. Tables 3 and 4 provide land cover and geographic reference statistics for two regions: the CIMAH Squares (shown in Figure 1) and Great Britain. About 40 per cent of the land cover in the CIMAH Squares is classified as urban or suburban (about 12,200 ha), 38 per cent of the total area of the CIMAH Squares is built-up towns and villages (about 11,500 ha), and about 50 per cent is open countryside. This means that about 1-2 per cent of towns and villages in Great Britain are in the immediate vicinity of Top Tier CIMAH Sites (e.g. within 1 km) and are potentially under threat from accidents.

The land cover data can also be used determine the threats to scarce habitats in Great Britain. For example, estuarine and coastal habitats (e.g. saltmarsh) are nationally scarce habitats and are considered by the DETR to be of “intermediate” importance in terms of accidents. Estuarine and coastal habitats (e.g. saltmarsh, coastal bare, inland water, and sea/estuary land cover types) make up about 8.5 per cent of the CIMAH Squares (Table 3) or about 2500 ha. This represents just over 1.2 per cent of the national resource of these habitats.

Any potential impact on Sites of Special Scientific Interest (SSSI), National Nature Reserves (NNRs) or other designated areas is a major concern. Established methods and criteria are used in the selection of these sites and it can be assumed therefore that they are of high value. The presence (or absence) of a designated area can be defined for each 1 km square, making it possible to use CIS to highlight those that occur within the potential range of influence of impacts arising from major industrial accidents.

Table 3. Land Cover Map Statistics for CIMAH Squares and Great Britain.

| <b>Land Cover</b>   | <b>Density<br/>ha/sq km</b> | <b>Total area<br/>ha</b> | <b>Total area in GB<br/>ha</b> |
|---------------------|-----------------------------|--------------------------|--------------------------------|
| Urban               | 18.34                       | 5538                     | 264900                         |
| Suburban            | 21.99                       | 6639                     | 1357000                        |
| Tilled land         | 17.8                        | 5376                     | 5138000                        |
| Managed grassland   | 17.55                       | 5302                     | 6533000                        |
| Rough grass         | 1.63                        | 491                      | 438700                         |
| Bracken             | 0.29                        | 88                       | 360000                         |
| Heath grass         | 1.98                        | 598                      | 2018000                        |
| Open shrub heath    | 1.64                        | 497                      | 2791000                        |
| Dense shrub heath   | 0.54                        | 162                      | 723200                         |
| Bog                 | 0.19                        | 56                       | 431000                         |
| Deciduous woodland  | 2.72                        | 820                      | 1209000                        |
| Coniferous woodland | 0.37                        | 112                      | 770800                         |
| Inland bare         | 4.37                        | 1318                     | 253200                         |
| Saltmarsh           | 0.5                         | 150                      | 38940                          |
| Coastal bare        | 1.54                        | 465                      | 142100                         |
| Inland water        | 1.8                         | 545                      | 170900                         |
| Sea/estuary         | 4.68                        | 1413                     | 768300                         |

Table 4. Geographic Reference Attribute Statistics for CIMAH Squares and Great Britain.

| <b>Attribute</b>    | <b>Density<br/>ha/sq km</b> | <b>Total area<br/>ha</b> | <b>Total area in GB<br/>ha</b> |
|---------------------|-----------------------------|--------------------------|--------------------------------|
| A-roads             | 0.74                        | 223                      | 58190                          |
| B-roads             | 0.27                        | 83                       | 28910                          |
| Built up - Towns    | 35                          | 10530                    | 1062000                        |
| Built up - Villages | 3.15                        | 949                      | 629400                         |
| Canals              | 0.12                        | 37                       | 2848                           |
| Minor roads         | 0.56                        | 169                      | 138900                         |
| Motorways           | 0.18                        | 54                       | 12300                          |
| Open Countryside    | 50.62                       | 15240                    | 18890000                       |
| Railways            | 0.48                        | 144                      | 16060                          |
| Rivers              | 0.41                        | 123                      | 118000                         |
| Water - Inland      | 1.64                        | 493                      | 206600                         |
| Water - Sea & Tidal | 6.33                        | 1905                     | 948500                         |
| Woodland            | 0.71                        | 214                      | 1931000                        |

Sites of Special Scientific Interest (SSSI) are areas of land considered to be of special interest by reason of any of its flora, fauna, geological or physiographic features to owners and occupiers, local planning authorities and the Secretary of State (Environment). SSSIs cover the most important areas for the conservation of the range of habitats and diversity of wildlife occurring in Great Britain. Figure 2 has been created using the CIS overlay map facility and shows the coincidence of SSSIs in Great Britain with the different categories of Top Tier CIMAH sites. Some 55 CIMAH Squares (or about 18 per cent) are occupied by SSSIs.

The EC Council Directive on the Conservation of Natural Habitats of Wild Fauna and Flora - the Habitats and Species Directive (92/43/EEC) - requires Member States to take measures to maintain or restore natural habitats and wild species at a favourable conservation status in the Community. The Directive sets out requirements for the creation of Special Areas of Conservation (SACs). These SACs, with Special Protection Areas (SPAs) classified under the Birds Directive, will form an EC network of sites to be known as Natura 2000. This coherent European ecological network is designed to maintain habitats and species of community interest at favourable conservation status: defined in terms of the natural range being stable or increasing and of the existence of structures and functions necessary for the long-term maintenance of that status. Figure 3 shows the coincidence of SACs with the Top Tier CIMAH sites. Some 11 CIMAH Squares (or about 4 per cent) are occupied by SACs.

Environmentally Sensitive Areas (ESAs) are particular parts of the countryside where the landscape, wildlife and historic interest are of national importance. Many features of the countryside - hedges, walls, ditches, field barns, hay meadows, heather moorland and river valley grasslands - have been created by traditional farming methods over hundreds of years. These features are highly valued; both for their scenic beauty and for the habitats they provide for plants and wildlife. Figure 4 shows the coincidence of ESAs with the Top Tier CIMAH sites. Only 6 CIMAH Squares (or about 2 per cent) are occupied by ESAs.

National Nature Reserves (NNR) are areas of national and sometimes international importance which are owned or leased by the appropriate statutory conservation body, or bodies approved by them, or are managed in accordance with Nature Reserve Agreements with landowners and occupiers. NNRs serve a variety of purposes, notably the conservation of the special interest of sites, the provision of sites for research and study, the provision of advice on and the demonstration of conservation management, the furtherance of education, and the provision of facilities for amenity use and access for the quieter enjoyment of nature. NNRs are also classified as SSSIs and attract similar protection. Figure 5 shows the coincidence of NNRs with the Top Tier CIMAH sites. Only 4 CIMAH Squares (or about 1 per cent) are occupied by NNRs.

More detailed analysis is also possible, such as a more extensive characterisation of CIMAH Squares by looking at blocks of 1 km squares around each CIMAH site. For example, the Comparative Environmental Index (CEI) Report, commissioned by the Chemical and Biotechnology Division of DETR, helps operators and regulators of sites covered by the Seveso Directive to identify the environmental information that should be taken into account in assessing risks to the environment from an accident at a site. The Report presents a method for summarising this information as an aid to assessing overall environmental quality around an industrial installation. Part of the method involves the CIS, which is used to access integrate and present maps of the environmental data required to assess environmental quality round industrial and commercial installations.

Figure 2. Overlay Map of SSSIs and Top Tier CIMAH Sites.

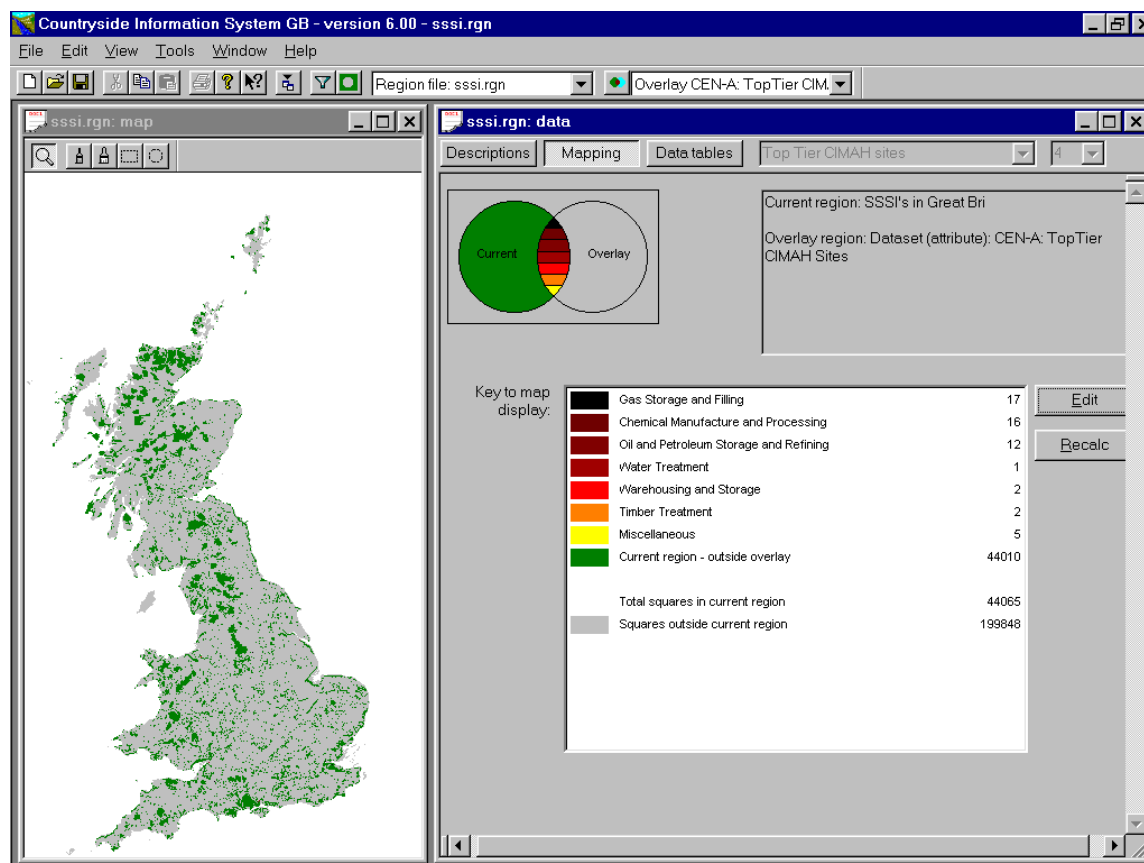


Figure 3. Overlay Map of SACs with Top Tier CIMAH Sites.

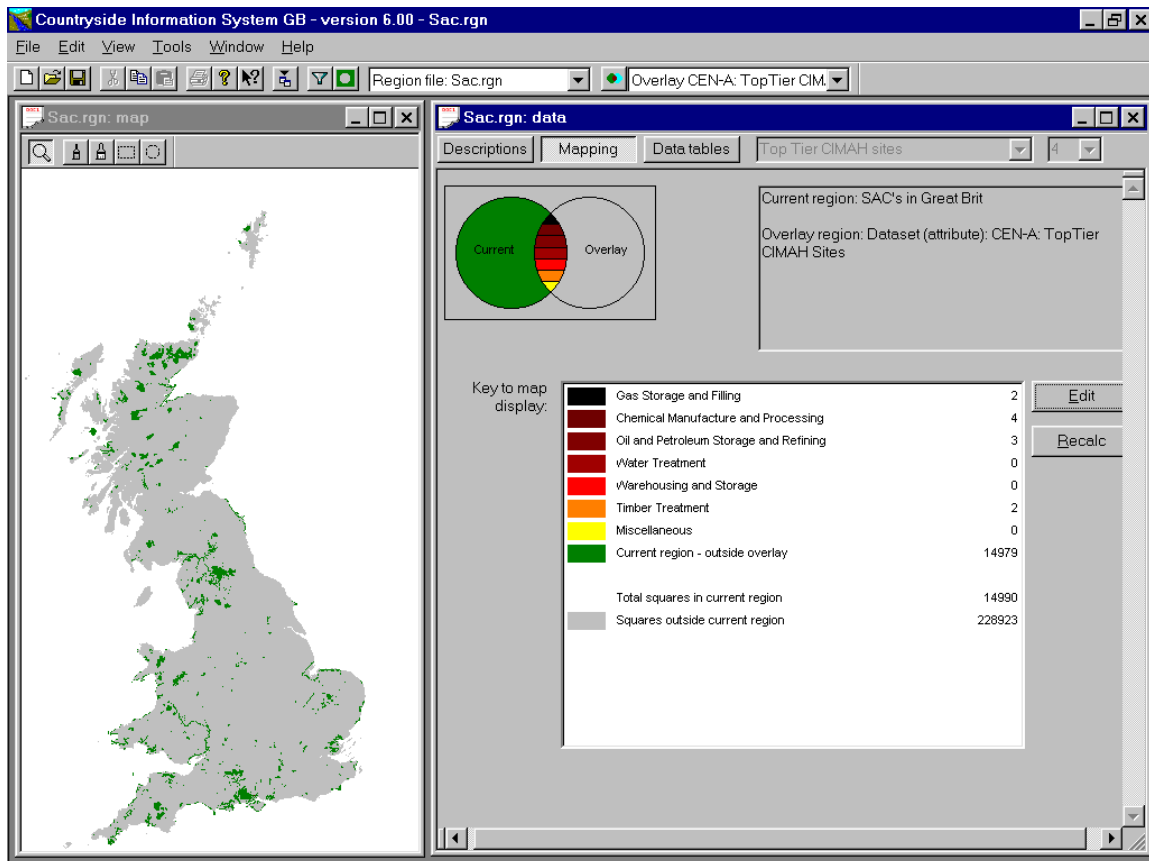


Figure 4. Overlay Map of ESAs with Top Tier CIMAH Sites.

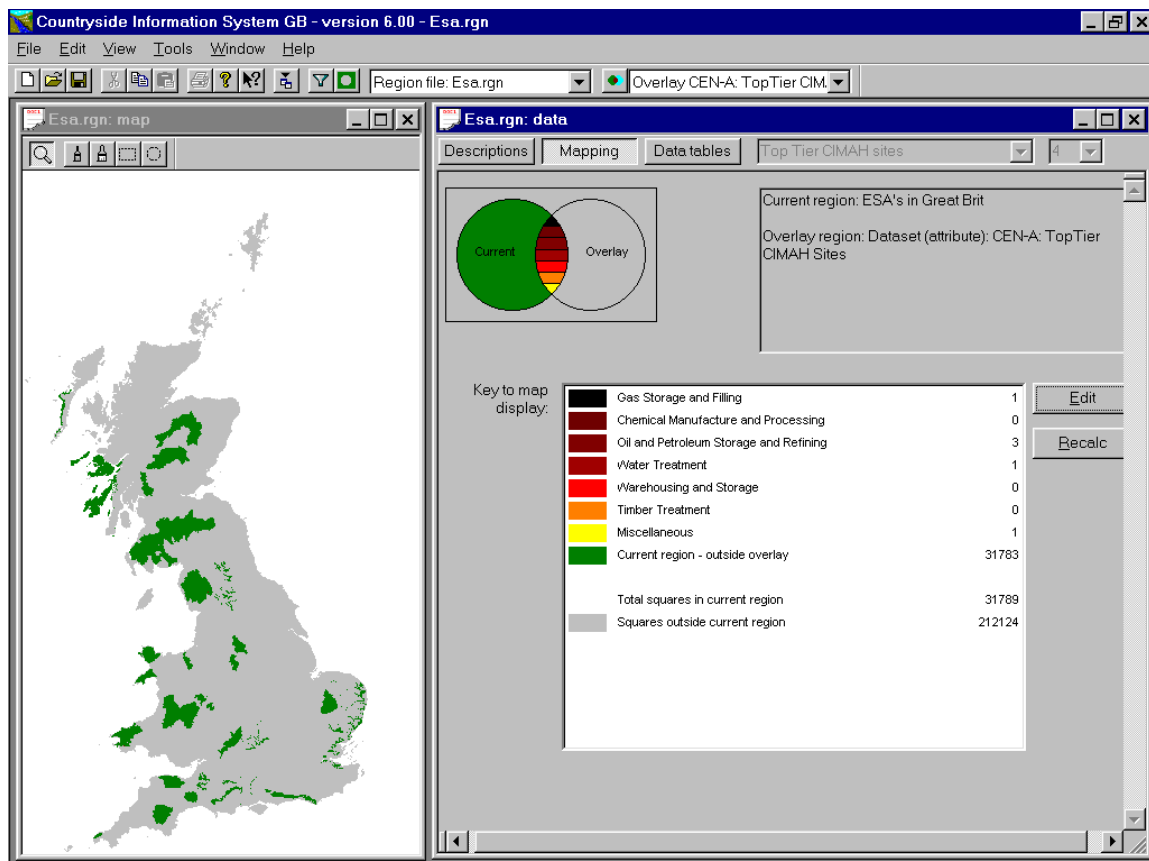
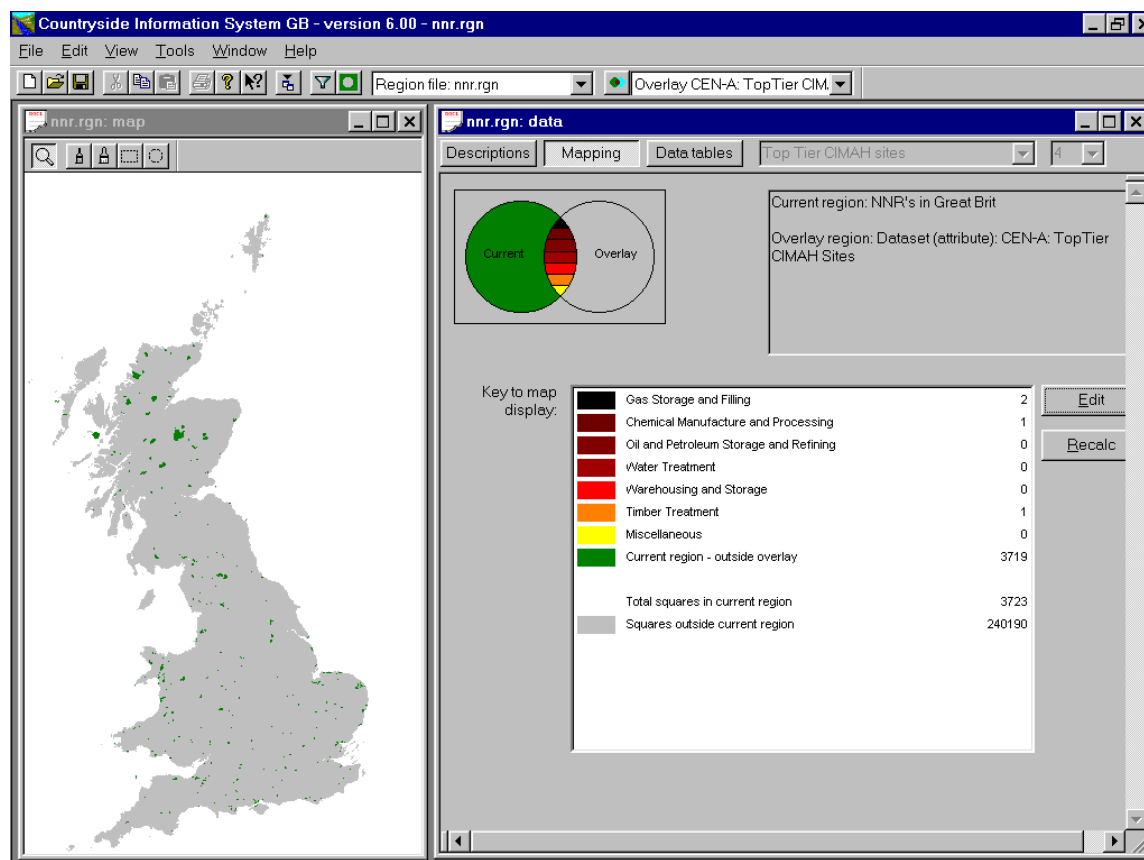


Figure 5. Overlay Map of NNRs with Top Tier CIMAH Sites.



## Conclusion

The unpredictable nature of industrial accidents, and their potential impacts, makes it difficult for the operators and regulators of COMAH sites to take all relevant environmental factors into account. This is because the analysis of risks to the environment requires knowledge of the characteristics of the environment and the likelihood that some important parts of it will be damaged by an accident. The inaccessibility of relevant information makes even the early steps in the process of risk analysis difficult. Conducting full-scale field surveys around sites could be time consuming and costly, as can consulting all holders of relevant environmental information.

The CIS overcomes some of these difficulties by providing access to a cost-effective means of obtaining useful information on the characteristics of the environment in the vicinity of an industrial or commercial installation, which can help focus the process of risk assessment.

## Further Reading

Department of the Environment, Transport and the Regions (1999). Guidance on the Interpretation of Major Accident to the Environment for the Purposes of the COMAH Regulations. The Stationery Office, London. Due June 1999.

Osborn, D., Roy, D., Hankard, P., Treweek, J.R., Eversham, B. and Manchester, S.J. (1999). Comparative Environment Index. Department of the Environment, Transport and the Regions, February 1999. The Stationery Office, London. 62pp.

A Guide to the Control of Major Accident Hazards Regulations 1999. L111. HSE Books. ISBN 0 07176 1604 5. Due July 1999.

Preparing Safety Reports: Control of Major Accident Hazards Regulations 1999. HSE Books. Due June 1999.

Guidance on the Environmental Risk Assessment Aspects of COMAH Safety Reports. Environment Agency. Available May 1999.