Using our brains to save and improve the lives of workers
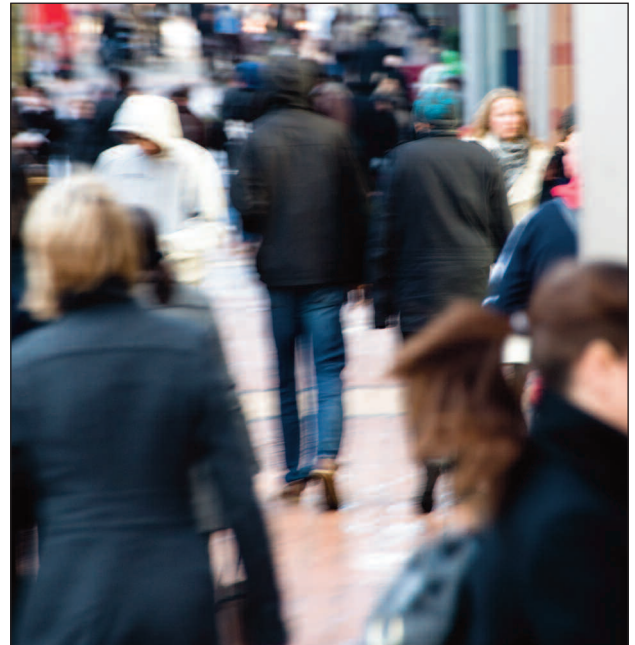
National Population Database (NPD) Tool

Working to provide detailed population estimates to inform HSE's societal risk work

The Client

The Health and Safety Executive (HSE) has the day-to-day responsibility for enforcing health and safety legislation and its concerns range from nuclear installations and chemical plants, through to mines, factories, farms and many other workplaces.

The Problem

HSE requires population data to inform the risk assessment work it undertakes. National, robust and sufficiently detailed population data has not been available in the past. To address this HSE commissioned HSL and Staffordshire University to develop the National Population Database (NPD) tool. This is a Geographical Information System (GIS) based tool foridentifying and estimating population density and distribution for a range of population types and categories.

What we did

The NPD tool is a GIS application that uses a number of different source data sets for England, Scotland and Wales, from a national to a local level, to provide detailed estimates of populations. The development of the NPD tool presented a number of challenges, including the following specific key factors:

- HSE requires national coverage, which restricts the use of locally sourced data;
- HSE models accidents with highly variable impact and consequences; in some cases these can extend up to 20km and in others as little as 50 metres;
- HSE needs to differentiate between populations of varying sensitivity to harm;
- Population movement is highly variable in nature, during the day, week and seasonally;
- There are significant constraints on the availability of national scale data on land use.

Given these constraints the population database had to be approached as a representation of patterns of potential occupation rather than a precise measurement. Some layers in the database are, therefore, more accurate than others, due to the underlying nature of the data or the modelling technique used.

Generic population multipliers were developed and applied to buildings, transport and land uses to produce the database of population density and distribution.

Outcome/Benefits

Outcome/Benefits
The populations that are available from the tool include the following:

Residential	Daytime termtime/ Daytime non-term time/ Night time
Sensitive	Hospitals/ Schools (primary, secondary, boarding)/ Care homes
Communal Establishments	Prisons/ Stadia/ Recreational facilities/ Campsites
Transport	Motorways (average, peak and max. populations)/ A-roads (single, dual-carriageway, average, peak, max populations)
Workplace	Daytime population
Retail	Average daytime population Maximum population

"The National Population Database has been an essential and powerful part of HSE's technical development work for regulating on-shore non-nuclear major hazards. The output provides population data which HSE uses to estimate societal risk from major hazard sites. The tool along with HSL's GIS expertise is invaluable to HSE." Stuart Reston, Inspector, HSE Chemical Industries Division.