

So Who Needs Geoscience ?



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Geological Survey of Northern Ireland



British
Geological Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL

Dublin Castle 26th February 2003



Belfast Evening Telegraph, 1903

THE RECENT STORM
—
INTAKE FLOODED AT
LIMAVADY JUNCTION.
—
MANY FARMS SUBMERGED.
—
EXTRAORDINARY SCENES AND
INCIDENTS.
—
ENORMOUS DAMAGE.
—
UNIQUE PHOTOGRAPHS TAKEN
UNDER DIFFICULTIES.
(SPECIAL TO THE "BELFAST EVENING
TELEGRAPH.")
During the memorable storm of Thursday
night, the 26th ult., the sea, driven across
Lough Foyle, by a terrific gale from the north-
west, regained possession of its own, bursting
through the massive embankment or dyke



Ulster Museum

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Geoscience and Planning

- Why should geoscientists be involved in planning?
- What skills can geoscientists bring to the spatial planning process?

Collapsing limestone mine (last worked in 1829) - Edinburgh



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Geoscience - Challenges

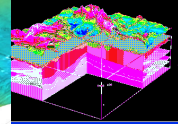
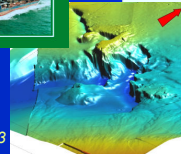
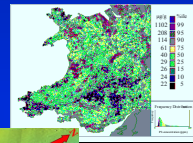
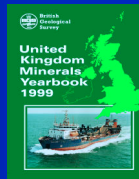
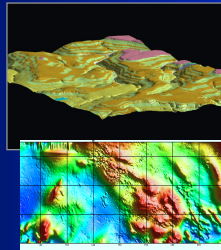
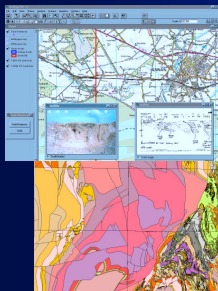
- To demonstrate the need for inclusion of geological knowledge
- To display information in a manner understandable by non geoscientists



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Geoscientists - Roles

- Collect data that built systematic earth models
- Monitor and record the changing planet
- Manage the scientific data collected
- Interpretation of data from multiple sources
- Develop methods to transfer this knowledge



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Why Should Geoscientists be Involved?

- Geoscientists have, and continue to embrace and adapt to change
- We need to have a ten-year+ vision
- There are few professions understand time better than geoscientists



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Why Should Geoscientists be Involved?

9 November, 2000



- Trained in the natural process that formed our landscape
- Ability to understand and interpret the 3D nature of the earth on local and regional scales
- Key input to Environmental Impact Studies
- Key team member in a broad-based practice

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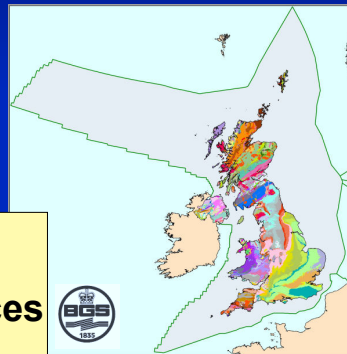
Why Should Geoscientists be Involved?

- Increasing costs of natural hazards
- Kobe earthquake 1995; \$150 billion total losses
- Mt St Helens 1981; \$2.7 billion economic losses
- Subsidence/mine collapse in UK £400m+annually
- Natural groundwater contamination
- Manmade ground contamination in UK - incalculable
- Mine water discharge



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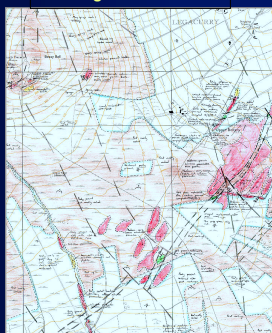
- More effective administration of sustainable development
- Improved National economic efficiency
- Environmental quality and standards
- Land use planning
- Environmental management
- Resource utilization



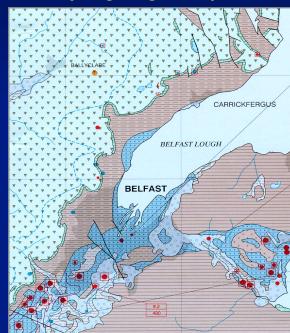
Because geoscientists
Define 3D geology and resources

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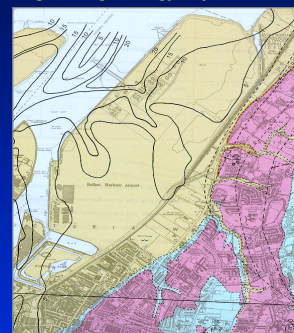
Geological Fieldsheet



Hydrogeological Map of NI



Engineering Geology Map of Belfast



- This requires understandable knowledge transfer in order to make informed, safe, sustainable and efficient choices

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Geoscientific Involvement

- Cost benefit of involvement at front end of the project
- Reduces the possibility of time and financial over-runs
- Improves management of project risk
- Holistic approach benefits all parties

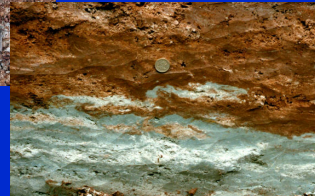
Unweathered, hard



Variably weathered



Fully weathered, soft



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Ireland - Geoscientific Inputs

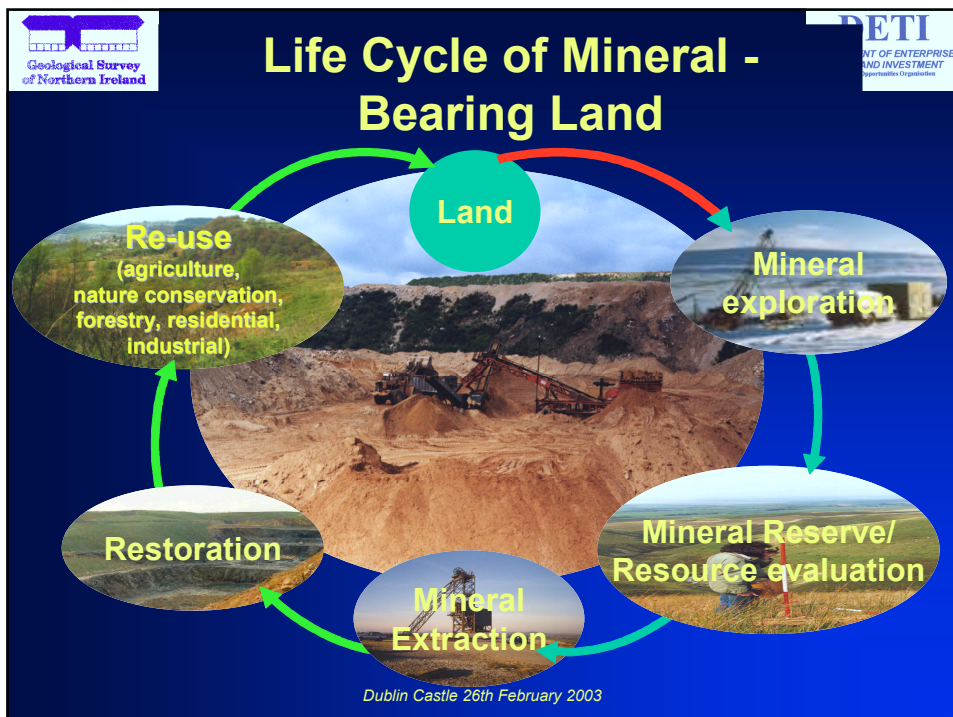
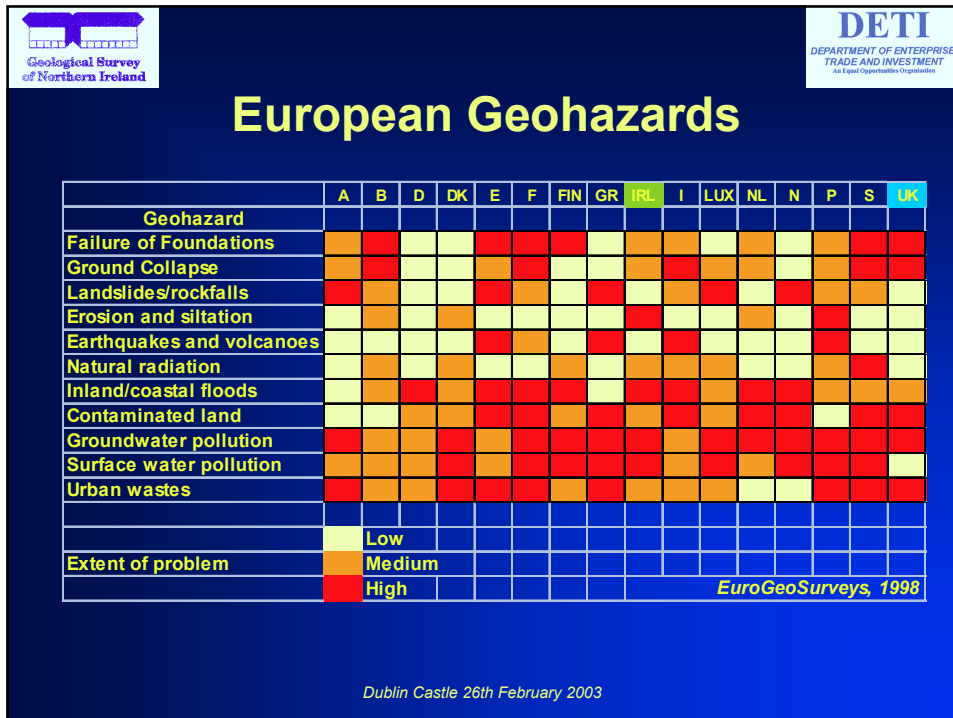
Natural Resources

Minerals	Construction Materials	Water
Copper	Sand & Gravel	Groundwater
Lead	Aggregates	Surface water
Zinc	Dimension Stone	
Barite		
Gold		
Lignite		
IMs		

Geohazards

Manmade	Natural
Mining collapse	Landslides
Landfill	Subsidence
Pollution	Cliff Stability
Mine-related gas	Flooding
	Shrink-swell
	Radon
	Erosion

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Key Elements of Mineral Planning

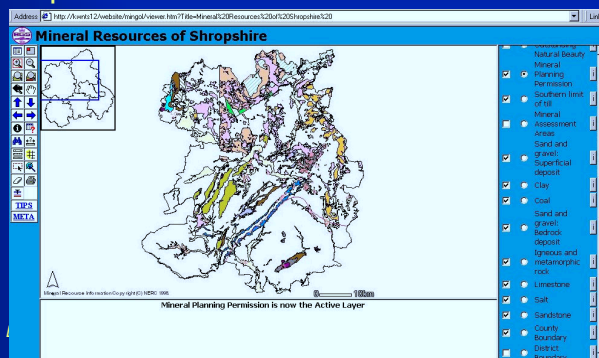
- Balance the essential need for minerals against protection of the environment and local amenity
- Make provision for the supply minerals by providing an effective framework within which the minerals industry may make planning applications
- Identify areas of possible future mineral working
- Ensure that land taken for mineral extraction is restored at the earliest opportunity for beneficial afteruse
- Prevent unnecessary sterilisation of mineral resources



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Minerals and Planning Information: West Midlands GIS

- Deliver information to assist sustainable resource management & policy development
- Contribute to the requirements of planners, developers and conservation interests for mineral resource information to optimise informed decisions
- Provide a relevant and long-term source of information for the future



Interpretation



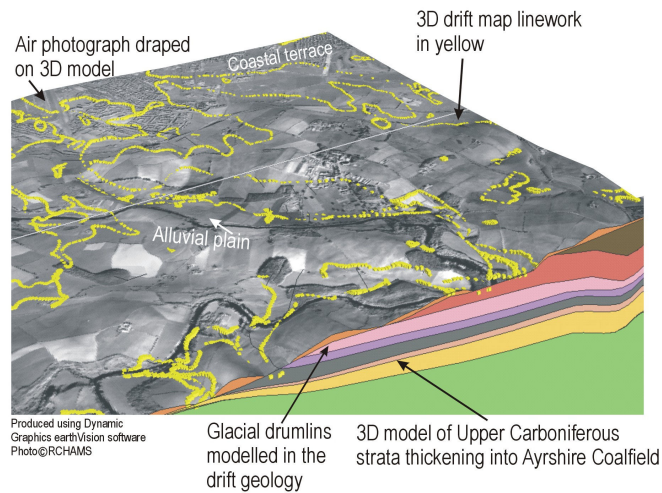
Ulster Museum

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3D Block Models



Ayrshire Coalfield - Visualisation



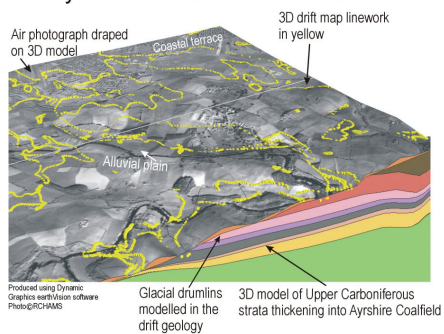
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3-D Visualisation - Uses

Ayrshire Coalfield - Visualisation



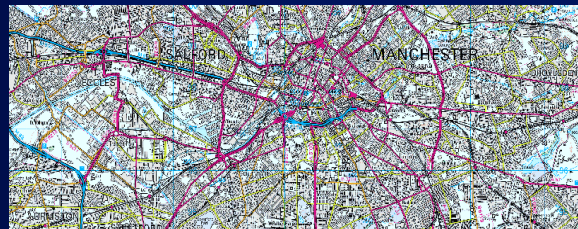
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- *Drift type and thickness - planning and construction, resources, flood risk*
- *Coalfield 3D model - subsidence risk, framework for mine*



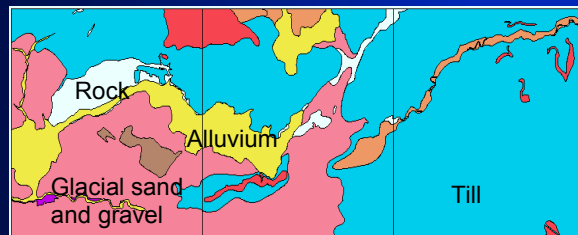
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Sub-Surface Modelling



Traditional geological maps have limitations

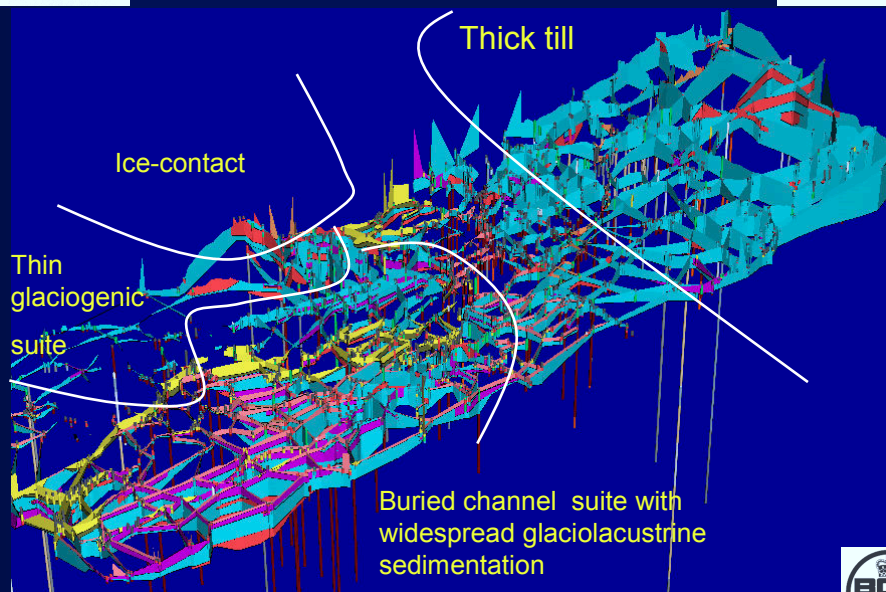
- Emphasis on the top 2m of strata
- Difficult to interpret
- Difficult to produce thematic maps



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Geological Domains



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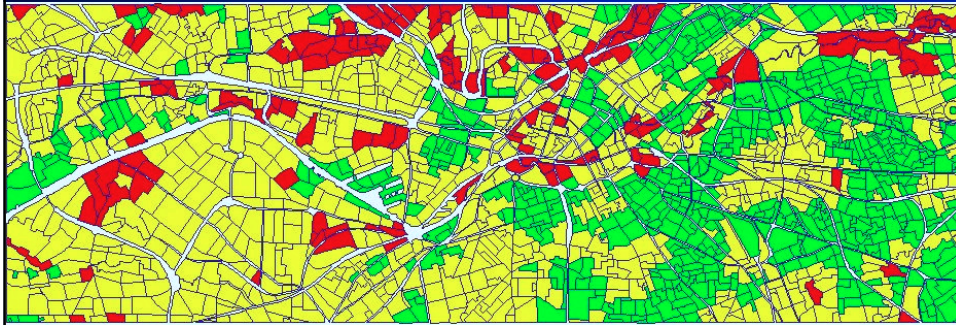


**The 3D model forms the basis from which
other thematic products can be derived
e.g. Maps showing**

aquifer vulnerability

geotechnical properties

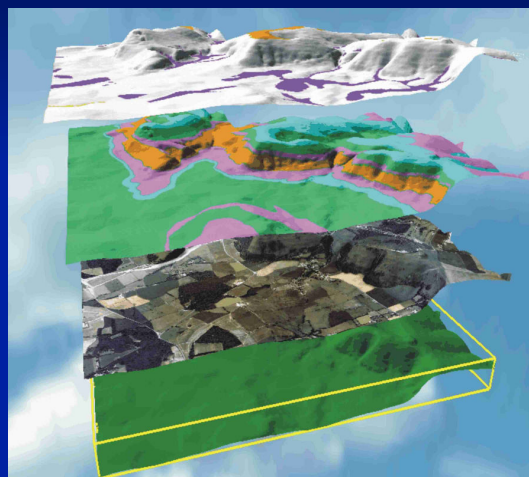
sustainable urban drainage



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Visualization

- Drift
- Geology
- Aerial Photographs
- DTM



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Fly Through Visualization



Uses

- planning, construction, recreation, flood risk, land use

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The Way Forward

- Recognition of problems
- Recognition of solutions
- Holistic approach
- Joined-up thinking



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