

The Impact of Geology on some National Road Schemes

IGI Conference, Dublin Castle

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1

Geology of Ireland

- Solid (Rocks)
- Pleistocene (ice age)
- Recent

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Irish topography

- Generally mountains on the periphery with low lying central plain with local 'mountains' of largely Old red Sandstone or Lower Paleozoic rocks.
- Achieving drainage outfalls can be an design issue on certain project the central plain.
- Interestingly, no major road tunnels have been required to date.
- Mountains, raised bogs and river crossings dictated the corridors of early road network (O'Keefe, 2001)

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Topography of Ireland



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'Solid Geology'

- 'Solid' geology mainly Carboniferous or older rocks. (Precambrian and Palaeozoic rocks, amply covered in places by drift deposits but small areas of Mesozoic and Tertiary rocks, Holland 2001).
- The predominance of Carboniferous rocks has lead to significant areas with karst or palaeokarst features. Geological Survey of Ireland (GSI) has recorded about 3500 karst features.
- Generally clay minerals have been altered.

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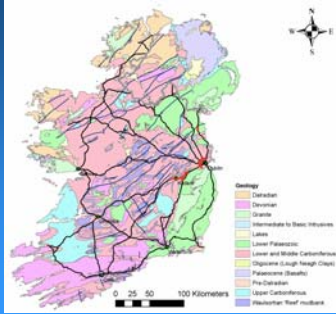


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Geological map of Ireland
(From Geological Survey Of Ireland)

6

Roads on geological map

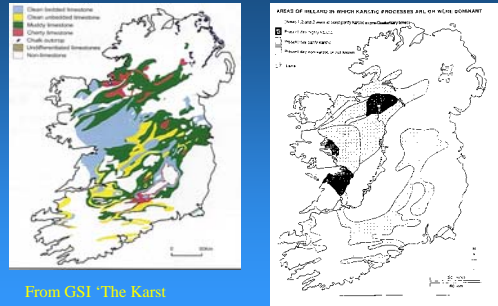


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Areas of Karst



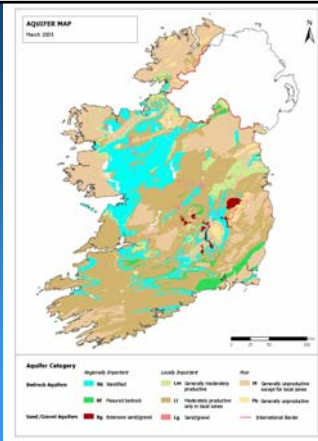
From GSI "The Karst of Ireland"

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Courtesy of Geological Survey of Ireland



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Engineering implications of karst

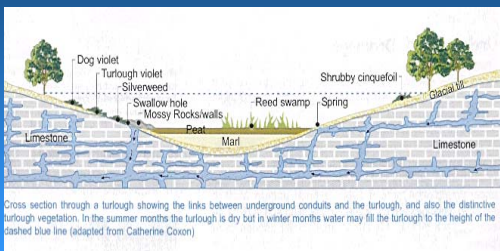
- Environmental factors
- Foundations
- Road support
- Drainage
- Investigation methods

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Turlough

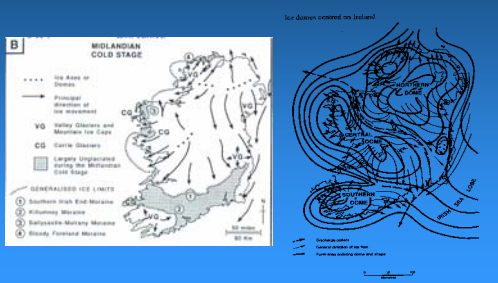


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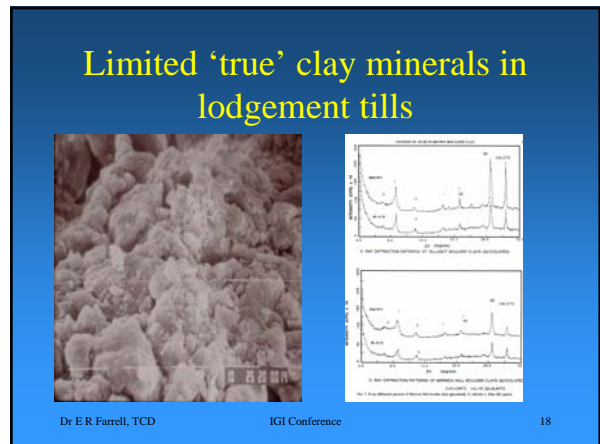
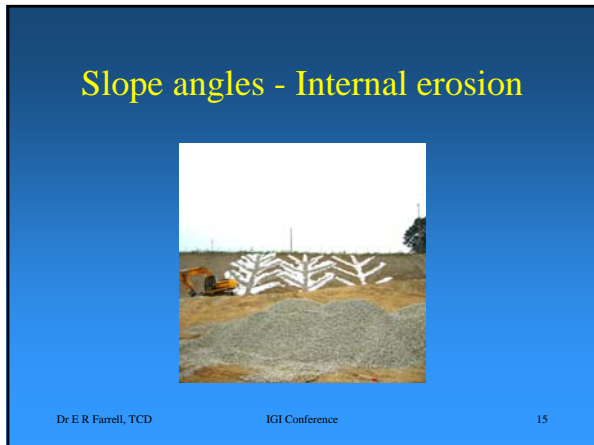
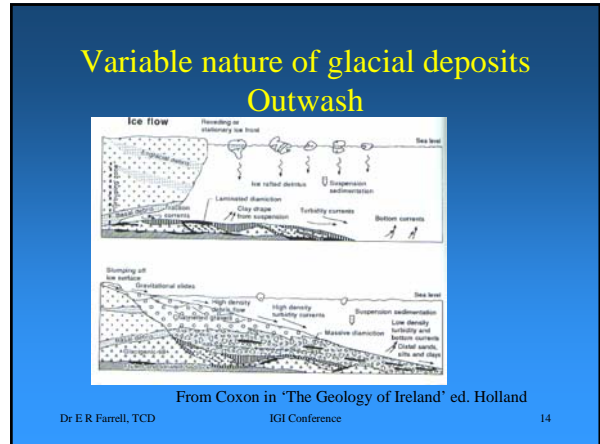
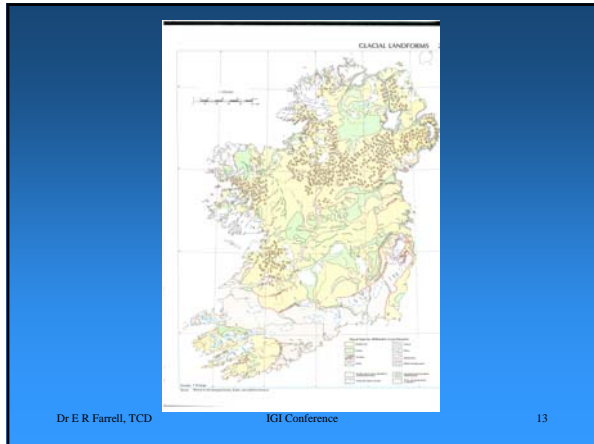
Glaciations of Ireland



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Engineering impacts of glaciation

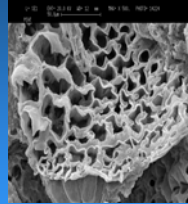
- Variability of depositional processes.
- Post-depositional processes (Reading the Irish Landscape by Mitchell & Ryan, 1993)

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Recent deposits

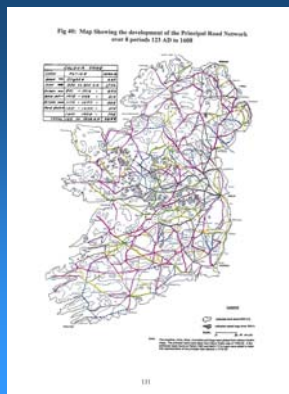


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From
O'Keefe, 2001



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Impact of recent deposits on Road Network

- The development of economic methods of constructing on peat continues to be a challenge
- The time scale of current construction road construction project is limiting the options available.

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Peat filled depressions

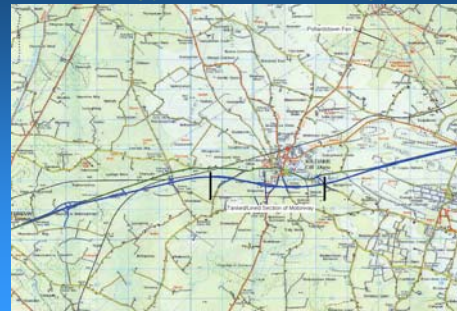


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Geology- Roads- Ecology



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Pollardstown Fen

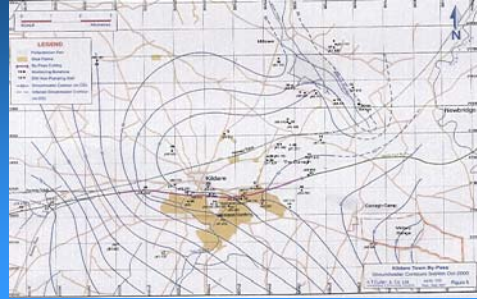


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Mid-Kildare Aquifer



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Groundwater control system



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Impermeable material above liner



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View of Kildare Town Bypass



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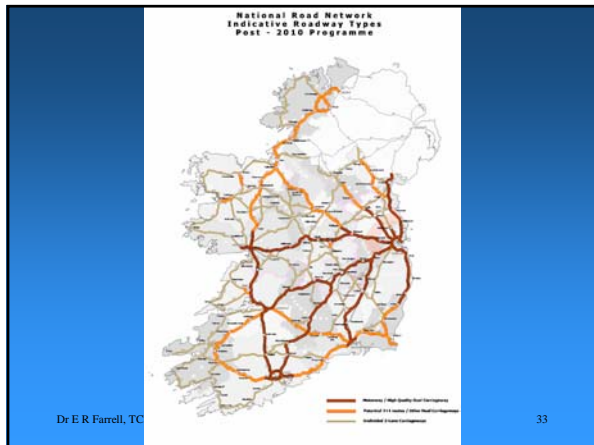
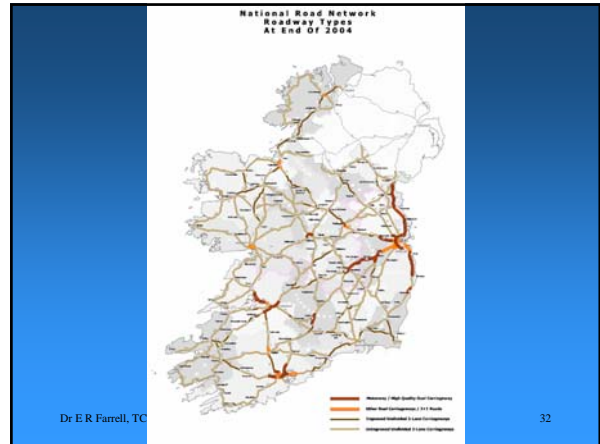
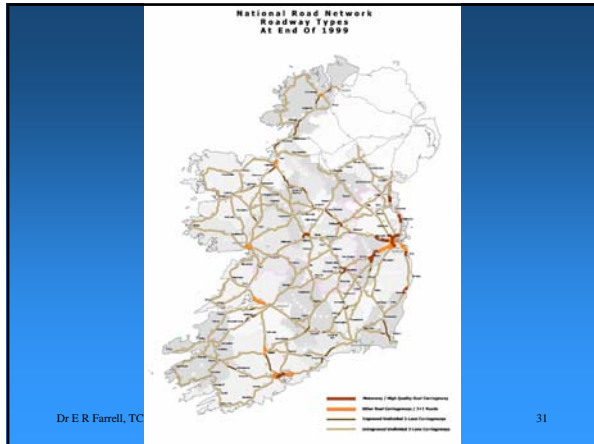
Geology and Construction materials

- Glacial sands and gravels
- Earthworks
- Pavement layers
- Rock

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Features of Geology of Ireland

- 'Solid' geology mainly Carboniferous or older rocks.
- Karst and palaeokarst features are significant factors in road design.
- Our geomorphology is dominated by glacial landforms with all its variety.
- Recent deposits of peat and highly organic soils continue to pose a challenge to road engineers.

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34