

# Bridge Management in Ireland

International Bridge Forum  
13-16 September 2009

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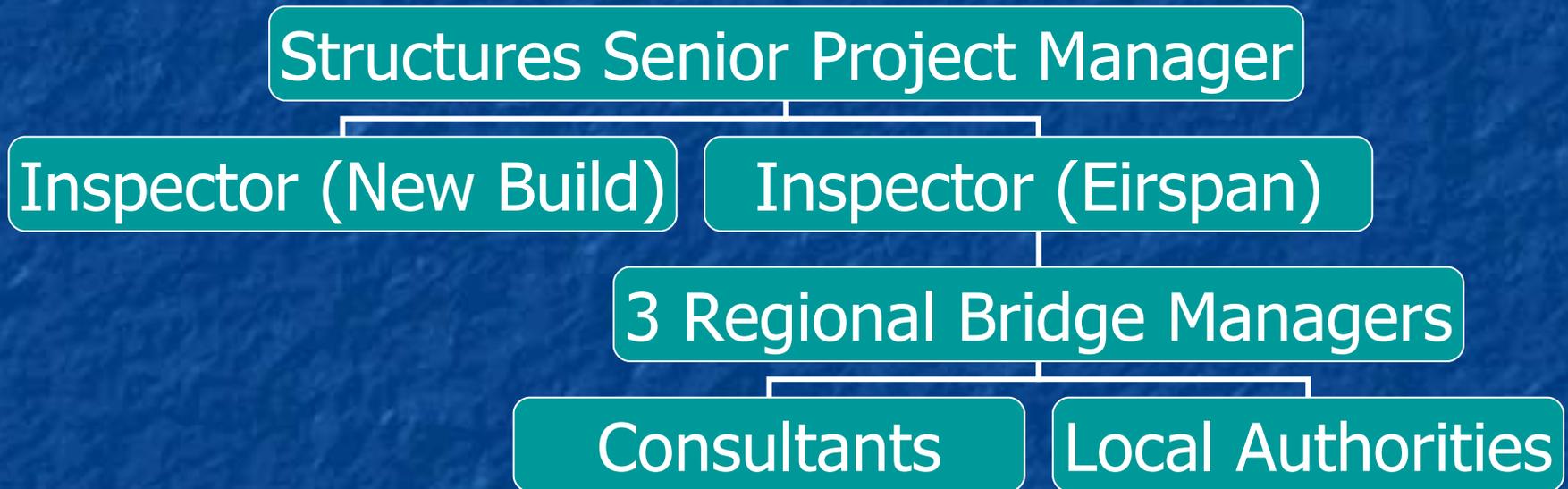
# Overview

- Introduction to National Roads Authority
- Bridge management organisation
- Inspection types and intervals
- Trends in bridge defects
- Research initiatives
- Engineering Services procurement
- Successes & Challenges

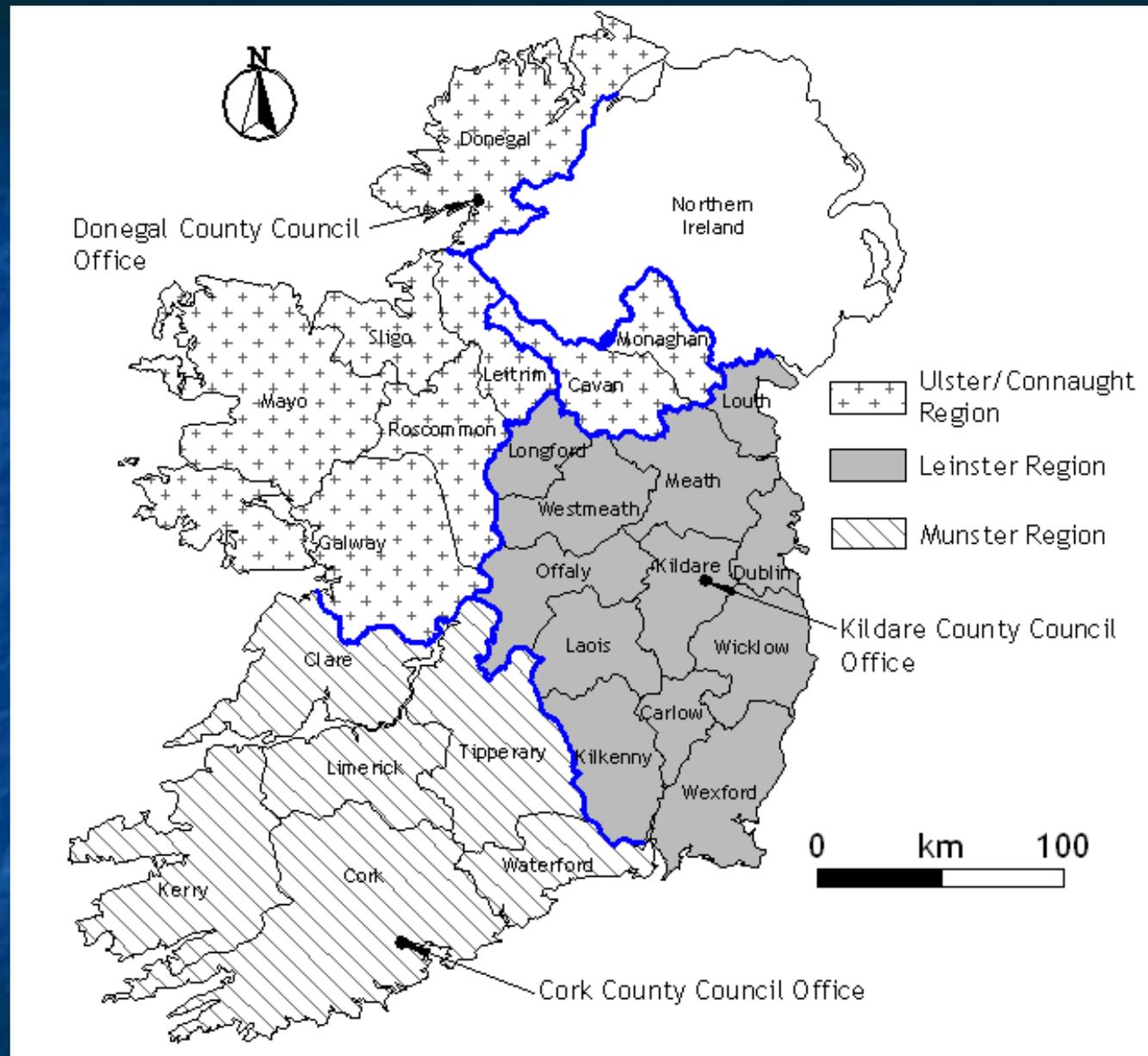
# Introduction to National Roads Authority

- Motorways, National Primary and Secondary routes
- Transport 21 & National Development Plan
- NRA Annual Expenditure €1.4 billion (2009)
- 2,800 Bridges >2.0m span
- Historically, local level bridge maintenance
- Eirspan introduced 2001

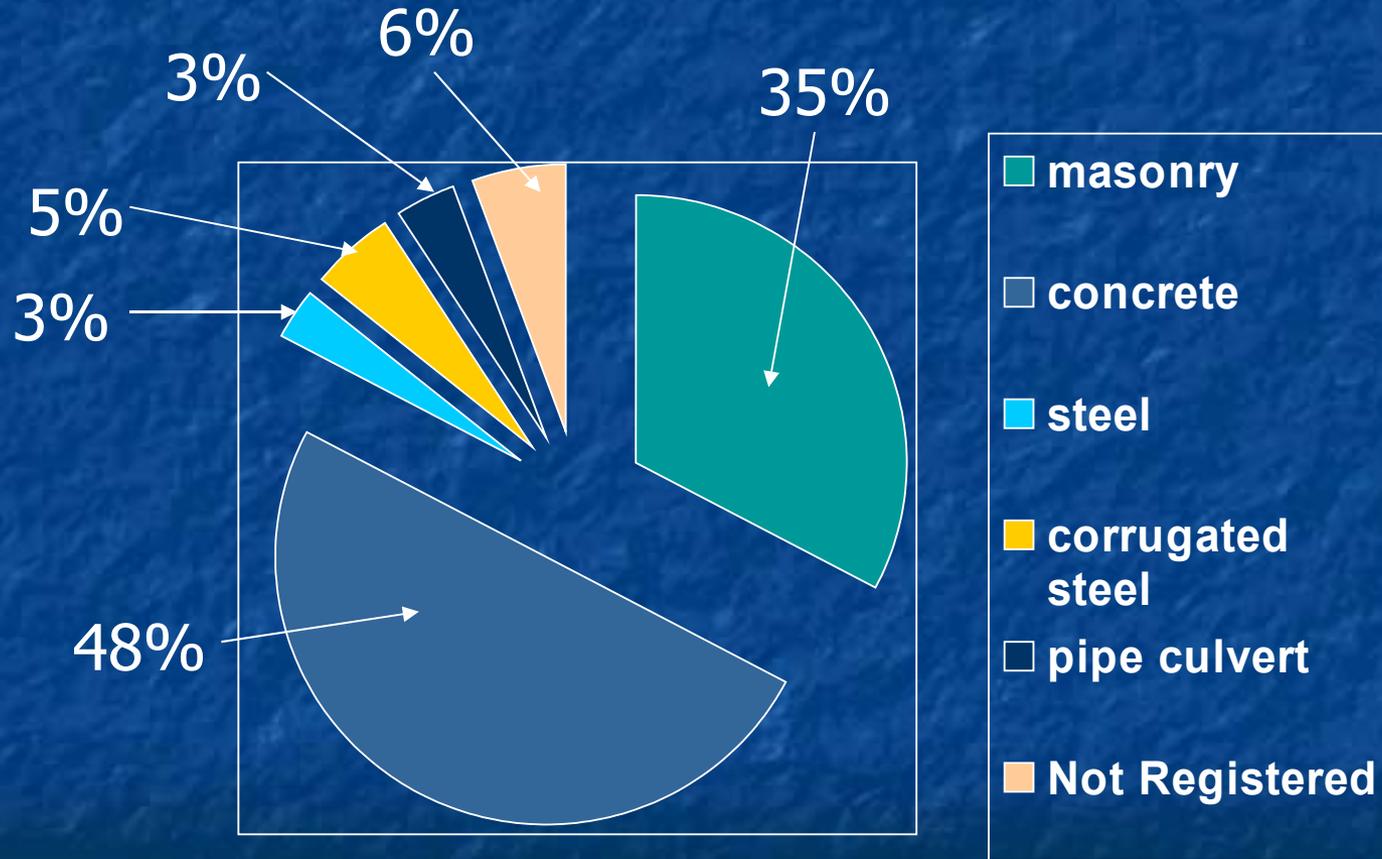
# Staff Structure



# Bridge Management Regions



# National Road Bridge Types



# Eirspan Inspection Modules

- Principal Inspection
  - Visual inspection by bridge engineer
  - Condition rating 0-5
  - Inspection interval 1-6 years
- Routine Inspection
  - Annual by local authority engineer
- Special Inspection
  - Underwater, PTSI

# Eirspan Structural Assessments

- Commenced 2003
- Approximately 1500 number total
- Stage 1 Approximately 25% complete
- MEXE & ARCHIE
- Grillage

Storm chaos

# Worst winds in years

Gales lead to severe floods and damage to homes

Michael Lavery and Cormac Murphy

THE COUNTRY awoke today to the aftermath of the worst storm in years, which caused flight delays, flooding and electricity blackouts.

A mopping-up exercise will now get under way as the full extent of the damage to homes and businesses in the worst-hit areas is assessed.

And while the high winds eased last night, Met Éireann warned that there was a possibility of another storm later in the week.

Amazingly, no deaths were reported in the Republic yesterday, although one man in Co Down died when he was swept into the sea by a large wave as he walked near a harbour wall on Saturday night.

Two fishermen held on to Paul Bogues after he fell into the water in Ardglass, Co Down, but he was later declared dead at hospital.

It was the second tragedy to hit his family this year. The body of his son Conor (26) has not been recovered since his fishing boat sank off Ardglass in January.

Two men in Tramore, Co Waterford, had a lucky escape when they were blown into the sea by high winds. Gardaí managed to rescue one of them while a coastguard helicopter from Waterford winched another.

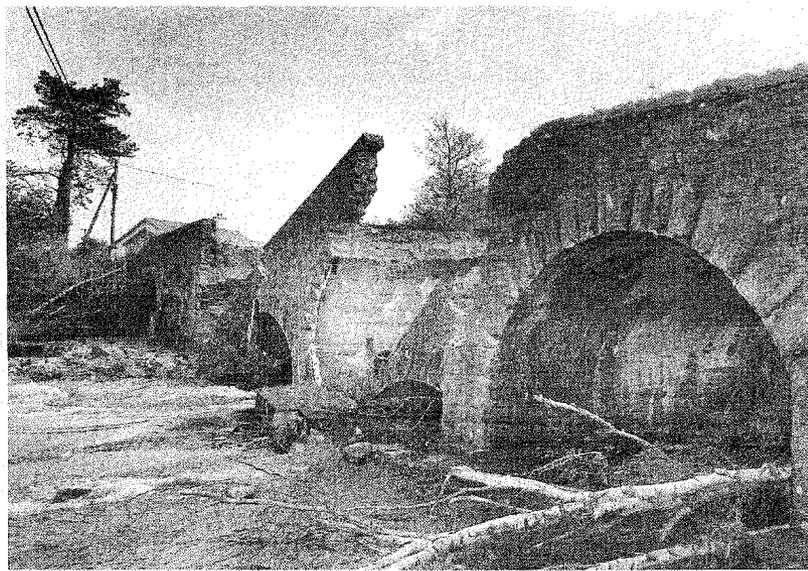
A garda suffered a suspected broken leg when she was trapped under a 30ft wooden hoarding blown over by storm force winds in north Dublin. She was on Operation Freeflow duty when gales knocked down the barrier, which was being used to block off a construction site just off the N32 Malahide Road.

She was taken to Beaumont Hospital. The N32 was closed for several hours as a result of the accident.

Met Éireann said the highest wind gust was recorded at 123kph in the greater Dublin region.

A search was underway for a man in his 50s seen entering the sea at Lahinch strand in Co Clare.

Asked if the Government would provide any flood



A bridge near Beaufort, Co Kerry, which was washed away last night as a local river burst its banks. DOMINICK WALSH/REY FOCUS

## Mudslides, power cuts and blocked roads

### Kerry

Anne Lucey

SEVERE weather led to minor mudslides, power cuts, floods, fallen trees and blocked roads in many parts of Kerry yesterday.

A number of social and sporting activities were

postponed with the worst of the weather experienced in the mountainous south of the county.

The main Ring of Kerry road between Killarney and Killorglin was impassable at Beaufort because of flooding.

Up to 20 cars got stuck in water early yesterday and units of the fire service were called to provide assistance. Diversions were in place.

Several bridges in the Killorglin and south Kerry area were impassable where rivers over-flooded.

And two houses were evacuated in Killarney town because of a minor mudslide. Gardaí said this was a precautionary measure.

A road collapsed in Glencar in the heart of MacGillycuddy's Reeks and the main Corc to Killarney Road was also

affected by a minor mudslide. Trees fell across roads in the north of the county where the Lixnaw area was badly affected, according to gardaí.

East of the county and in the Killarney area experienced electricity outages on Saturday night and into the early hours of yesterday because of the bad weather.

The afternoon yesterday also saw electricity cut for

a number of hours, with hotels and homes in the Muckross area affected as ESB crews battled to restore power.

In Kenmare, the annual torchlight Christmas parade and blessing of the crib was postponed until next Friday night, because of the atrocious weather conditions which saw roads flooded in much of the Killybeggs and Kenmare areas.

relief funding for counties affected and the Dublin Airport Authority said that by yesterday evening 31 incoming flights had been diverted to other airports, mainly Shannon, Belfast and Manchester.

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Over 100 flights were affected and the Dublin Airport Authority said that by yesterday evening 31 incoming flights had been diverted to other airports, mainly Shannon, Belfast and Manchester.

"We have had 59 scheduled departures cancelled," a spokesman said.

The morning flights, many from the UK and Europe, had been cancelled

before they left their home airports.

Aer Arann, which uses twin-engine propeller-driven planes, cancelled all its flights.

In the afternoon, Aer Lingus suspended its check-in service for several hours.

The disruption at the airport is expected to have a knock-on effect on services today.

The adverse weather conditions led to the cancellation of Stena Line sailings from Dun Laoghaire to Holyhead, while an Irish Ferries departure from Rosslare to Cherbourg and in the return direction were also deferred.

All Irish Ferries Dublin Swift sailings on the Dublin to Holyhead route were cancelled, with passengers being transferred to the

large ferry, *Ulysses*. Ferry companies advised intending passengers to check with them before travelling.

In Dublin, DART services were disrupted by fallen trees on the line, with no trains between Lansdowne Road and Dun Laoghaire from 10am to 4pm.

Delays to intercity lines between Bray and Greystones meant there was no

Trends in  
Bridge Defects

# Leenaun Bridge Moments Before Collapse



# Leenaun Bridge Moments After Collapse



# Leenaun Bridge Upstream View



# Concrete Structure Condition



# Corrugated Steel Culverts – 100% Section Loss



# Defects: Poor Drainage on Masonry Arches



# Defects: Poor Drainage – Washout of fines



# Defects: Poor drainage – Washout of mortar



# Lime Mortar Repointing Specification

- Technical
  - Higher flexural strength, lower compressive strength
- Heritage
- Site trials to investigate adequacy of mechanical repointing with various lime mortar mixes
- Train contractors to use lime mortars on arch bridge repairs (3 day course)
- Develop a specification for repointing
- Ongoing refinement of specification

# Repair – Lime Mortar





14 Jun 2004 13:48



# Endoscope survey



# Research Initiatives

- Research
  - Masonry Arch Bridge Repointing Specification
  - Monitoring Efficiency of Concrete Repairs in an Aggressive Environment
  - Develop an assessment framework for masonry arch bridges
  - Develop a bridge network life cycle cost model

# Ferrycarrig Bridge Monitoring



DSCF3771

Photos taken on the 25th January 2008

Photos by Peter Barrow Photographers - Ph: 045 401070

# Efficiency of Concrete Repairs in a Marine Environment

- Pier crosshead strengthening
- Crosshead concrete repairs:
  - Standard OPC mix
  - OPC mix + increased cover
  - OPC mix + silane
  - OPC mix + mixed-in corrosion inhibitors
  - GGBS mix
- Remote monitoring of
  - Rate of chloride penetration
  - Rate of corrosion if initiation occurs



DSCF1746

Photos taken on Thursday 29th November 2007

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# Procurement of Engineering Services

- Framework Agreements
  - Tranche 1: Call-off in Rotation
  - Tranche 2: Mini-tenders 30%price & 70%quality
  - 4 Lots of services (work type & regional split)
  - 8 consultants per Lot
  - Good vfm and reduced procurement periods

# Successes

- Masonry repointing specification
- Engineering Services Framework Agreements
- Commenced use of CFRP
- RM pilot project with contractor
- Minimum requirements for bridge inspectors

# Challenges

- Network level decision making 8 years on
- Local authority opposition to private contractors
- Introduction of performance scoring in traditional procurement of Works contractors
- The move to Asset Management
  
- Discussion – Waterproofing without red sand asphalt?