

A Decade OF PROGRESS

The first decade of the 21st century witnessed the development of a modern and remarkable road infrastructure in Ireland – an engineering achievement that ranks with the great accomplishments of the past, such as rural electrification, the railway network and canal ways.

This book tells the story of Ireland's modern road development, which called for the commitment, effort and co-operation of Government, the Department of Transport, local authorities, An Garda Síochána, consulting engineers, contractors, archaeologists, landowners and the general public. The National Roads Authority led the programme, but it was a national effort.

Well over one hundred thousand people worked on the roads programme during this time. This is the story of what they achieved.



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2000-2010

2000 - 2010

FOREWORD

The first decade of the 21st century witnessed the development of a modern and remarkable road network in Ireland – an engineering achievement that ranks with the great accomplishments of the past, such as rural electrification, the development of the railway network, and the development of the canal ways.

The improvements to the road network are a legacy that will benefit future generations. Achieving this legacy, however, was no easy feat and the story that follows is an insight into why and how, in little more than a decade, Ireland upgraded almost all of its busier primary routes. It required billions of Euro in investment, tens of thousands of workers, innovative financing schemes, the co-operation of many companies and organisations, the introduction of new technology and determined leadership with a clear vision of what was to be achieved.

At the time the improvements were launched, no one foresaw the phenomenal economic growth that Ireland would experience, and yet the new national road network has coped with all of the demands placed upon it. This infrastructure has helped to improve our competitiveness immeasurably on the world's economic stage, and to provide much safer and easier travel for the public.

The National Roads Authority led the programme, but this was a national effort. Well over one hundred thousand people worked on the National Roads programme during the decade and this is the story of what they accomplished.

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Fred Barry
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National Roads Infrastructure



2000

In the space of a decade, over one third of Ireland's national roads was transformed, including almost all of the busier primary routes. The extent of the improvements, in terms of number and scale of schemes, and geographical spread, can be seen in the list below.



2000 & 2001

- N7 Nenagh Bypass
- N9 Moone/Timolin
- M50/N4/N7/ Ballymount Free Flow Slips
- M50/M1 Free Flow Slips
- N72 Killarney Northern Road II
- M1/Dunleer/Dundalk
- M1/N2 Dunleer/Ardee Link
- N4 McNeads Bridge to Mullingar
- N4 Joanstown to County Boundary (Rathowen)
- N15 Clar - Barnesmore
- N20 Blackpool Bypass
- N20 Croom Bypass
- N20/N21 Adare/Limerick
- N21 Ballycarthy to Killally
- N24 Beary's Cross to Grange Cross
- N25 Kilmacthomas Bypass
- M50 Southern Cross Route
- N52 Link to Nenagh Bypass
- N56 Mountcharles Bypass

2002

- N4 Enfield Relief Road
- N9 Grannagh - Waterford Phase 1B
- N15 Bunduff/Drowes River (Leitrim)
- N17 Knock/Claremorris
- N18 Ballycasey/Dromoland (Newmarket on Fergus)
- N22 Bealagrellagh/Gortatlea
- N24 Piltown/Fiddown
- N25 Camaross

2003

- M1 Cloghran/Lissenhall
- M1 Lissenhall/Balbriggan
- M1 Drogheda Bypass
- M4 Celbridge Interchange
- M7 Kildare Bypass
- N8 Watergrasshill Bypass
- N11 Glen of the Downs
- N18/19 Hurlers Cross & N19
- N25 Youghal Bypass
- M50 Second Westlink Bridge
- N71 Skibbereen Bypass



2004

- N4 Hughstown - Meera
- N5 Strokestown/Longford (Scramoge)
- M7 Monasterevin Bypass
- N7 Parkway (Capped Contribution)
- N7 Limerick SRR Phase 1
- N8 Cashel Bypass
- N11 Rathnew/Ashford Bypass
- N22 Ballincollig Bypass
- N26 Ballina/Bohola Phase 1
- M50/N11 Wyattville Interchange

2005

- N1 Dundalk Western Bypass PPP
- N2 Carrickmacross Bypass
- N4 Kilcock Kinnegad PPP
- N4 McNeads Bridge Kinnegad
- N4 Sligo Inner Relief Road
- N6 Loughrea Bypass
- N21 Ballycarthy Tralee
- N22 Gortatlea Farranfore
- M50 South Eastern Motorway

2006

- N2 Ashbourne Bypass - M50 Jcn
- N2 Monaghan Town Bypass
- N4 Edgeworthstown Relief Road
- N7 Naas Road Upgrade
- N8 Fermoy Rathcormac Bypass
- N8/73 Mitchelstown Relief Road
- N15 Ballyshannon Bundoran Bypass
- N15/R280 Link Road Scheme
- N21 Castleisland Abbeyfeale
- N25 Kinsalebeg
- N25 Kinsale Road Interchanges
- N30 Enniscorthy Clonroche
- M50 Dublin Port Tunnel
- N52 Mullingar Bypass
- N55 Cavan Bypass

2007

- N1 NI Border/Dundalk
- N2 Castleblaney Bypass
- N4 Dromod Roosky
- N5 Charlestown Bypass
- N6 Kinnegad/Kilbeggan
- N11 Enniskerry Junction Improvement
- N11 Arklow/Gorey Bypass
- N18 Ennis Bypass
- N52 Mullingar - Belvedere
- N56 Mountaintop to Illistrin
- N77 Kilkenny Ring Road Extension

2008

- N6 Kilbeggan Athlone
- N8 Cashel Mitchelstown
- N8 Cullahill Cashel
- N9 Carlow Bypass
- N11 Kilpeddar Delgany Jnc
- M50 Upgrade Phase 1
- M50 Upgrade Phase 3

2009

- N4 Leixlip to M50 junction
- N6 Athlone Ballinasloe
- N6 Galway to Ballinasloe PPP
- N8 Fermoy to Mitchelstown
- N9 Kilcullen to Carlow
- N25 Waterford City Bypass PPP
- N51 Navan Inner Relief Road
- N52 Tullamore Bypass

2010

- N3 Clonee to North of Kells PPP
- N7 Castletown to Nenagh
- N7 Limerick Tunnel PPP
- N7 Nenagh/Limerick
- M7/M8 Portlaoise to Cullahill/C'town PPP
- N9 Carlow to Knocktopher
- N9 Waterford Knocktopher
- M18 Gort Crusheen
- N21 Castleisland Bypass
- M50 Upgrade Phase 2 PPP
- Var Motorway Service Areas Tranche 1

2010



THE INTER-URBAN
MOTORWAY NETWORK,
BUILT BETWEEN 2000-2010,
WILL BE SEEN AS A
REMARKABLE LEGACY
OF ENGINEERING, WHICH
WILL LAST FOR HUNDREDS
OF YEARS.

THE GENESIS OF THE PROGRAMME

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BACKGROUND

The history and evolution of the road network in Ireland is well described by Peter O’Keefe in his two volumes on ‘Ireland’s Principle Roads’ which, in turn, draw upon the work of many other scholars, and historical sources. These volumes were published by the National Roads Authority in 2001.

Little detail is known about the earliest road developments in Ireland, although remnants of Iron Age roads have been discovered in boggy areas where the timber has been preserved.

By the time Conn of the Hundred Battles was born, the Annals of the Four Masters record the existence of five principle roads to Tara. Classification of the roads was included in the Brehon Laws, some of which survive in the language to the present day. For example, a ‘Bothar’ was wide enough for cows to pass in both directions. Many townland names commence with ‘Boher’, and of course the description ‘boreen’ typically refers to a narrow, rural road.

The 18th and 19th centuries saw significant improvements in road-building technology, and the institutional arrangements for building and maintaining roads evolved. Many of the roads developed during this period were tolled, or turnpike, roads.

The turnpike was a basic form of turnstile, or a gate across the road, which a traveller passed through upon payment of a toll. Unlike the canal ways, which spread rapidly across Ireland during the mid-18th century and were used primarily for commercial transport, the turnpike roads were more locally focused - rarely being longer than 40 kilometres. Not surprisingly, the routes around Dublin were the first to be developed and the network expanded from there. Turnpikes were the mainstay of transport routes for over a century before their popularity waned with the spread of the railways in the mid-19th century.

Roads, railways and canals were core modes of transport, all playing important roles during the mid-1800s to the late 1990s. Roads were built to connect the many villages and towns along the route and, as roads spread, so more villages and towns were born. The development of roads continued into the 1990s, at which point the pressure on the old road network was immense.

Car usage was expanding rapidly, workers were commuting greater distances, the population was increasing and economic growth had led to increased freight traffic. Almost all inland transport in Ireland is road-based, as the distances are too short for most goods to be carried economically by rail. Between 1975 and 2000, the number of mechanically propelled vehicles under licence increased from 0.7 to 1.7 million and, indeed, increased further to 2.5 million by 2009, but the roads had never been designed to cope with such volumes of traffic.

Motorists who experienced the country's roads in the 1980s and early 1990s will remember the arduous journeys that were required when driving between the major cities. As an example, a driver heading from Dublin to Galway could take over four hours to reach his or her destination. A sea of brake lights, trails of exhaust fumes, moving forward a yard at a time – almost every town and village was a bottleneck as local and regional roads had to be traversed. From Chapelizod and Lucan on Dublin's outskirts, right across the country, the bottlenecks created a journey that few will recall fondly and have since become a part of travel folklore.

The benefits of the odd bypass, built between the 1970s and 1990s (e.g. the N6 Athlone Bypass and the N7 Naas Bypass), while very welcome, offered only limited comfort to road users as more congestion lay ahead.

The problems were not confined to commuters and casual travellers. The cost and unpredictability of travel times were also harming Ireland's economic progress and competitiveness. Irish commerce was suffering as goods were delayed in transit and lengthy travel times resulted in increased direct and indirect costs.

Ireland has long had a focus on attracting Foreign Direct Investment, but as the IDA attempted to lure businesses to Ireland and, particularly, to the regions outside Dublin, many of these companies were put off by the quality of the roads.

Another key concern was safety. The 1970s proved to be the worst decade for the number of deaths on Irish roads, with an annual average of nearly 600 deaths. This improved in the 1980s, but the cost in terms of lives lost and people injured remained too high.

Something had to be done to tackle these problems, and the first step was to establish the National Roads Authority.

THE NATIONAL ROADS AUTHORITY

The National Roads Authority evolved out of the Department of the Environment & Local Government. It was established under the Roads Act, 1993, as an independent statutory body.

With the Government's commitment and support, the newly founded Authority was charged with securing the provision of a safe and efficient network of national primary and secondary roads. These were the key components of the country's transport infrastructure and the arteries of the economy. The Authority was given overall responsibility for the planning and supervision of construction and maintenance works on these roads.

When the Authority was set up it was a small organisation. There were no planners, environmental experts or archaeologists, but these were introduced over time as the Authority grew and as its role evolved and expanded.

The Authority established close working relationships with local authorities – the legal roads authority in their jurisdiction – and these relationships were central to the progress that was achieved over the following decades.

It is worth noting that by establishing a single organisation to manage the network, Ireland was conforming to recognised practice in other European countries, where equivalent roads authorities existed.

NATIONAL STRATEGIC PLANS

National Road Needs Study, 1998

The NRA commissioned a comprehensive review of the state of the road network in the mid-1990s. The review was called the National Road Needs Study. It focused on the general condition and performance of the road network, and the motorist's travel experience (such as bottlenecks encountered and the length of journeys). In essence, it assessed the 'level of service' delivered by Ireland's network of national roads. It also looked at how the significant traffic growth and resulting congestion which Ireland was experiencing, would impact negatively on economic activity, road safety and the environment.

Published in 1998, it went on to identify national road investment needs over the period 2000-2019, based on assumptions relating to population growth and the demands of an increasing volume of traffic.

This forward-looking and comprehensive traffic analysis was the first of its kind in Ireland.

River Suir Bridge, Waterford City Bypass.



National Development Plan (2000-2006)

At the time that the National Road Needs Study was being completed, the Government was preparing to develop the next National Development Plan (NDP), intended to ensure Ireland's continuing economic progress, national growth and prosperity.

Ireland was one of Europe's fastest growing economies in the 1990s, with growth three times the EU average. It was generally recognised that this level of growth could not be sustained unless a number of issues were addressed effectively.

The National Development Plan (2000-2006) consequently focused on:

- Infrastructure
- Productive investment
- Education and training
- Regional development
- Social inclusion

The Government planned to invest €57 billion in these areas over the course of seven years. Improving infrastructure was one core objective, intended to achieve a better regional balance, support economic growth and help relieve the problems of congestion. As the primary mode of transport within Ireland, roads then carried 96% of passenger traffic and 93% of goods traffic.

This NDP included the largest and most ambitious investment plan that had ever been drawn up for Ireland. The plan was to be funded primarily from domestic sources, but EU funding support would also be relied on.

M19 Knocktopher.

**The NDP's main objectives for the network of national roads were to:**

- Improve reliability by removing bottlenecks, resolving capacity deficiencies and reducing journey times;
- Improve internal road transport infrastructure between and within regions;
- Ensure better access to ports and airports;
- Contribute to sustainable transport policies, and
- Help to achieve the targets of the Government's Road to Safety Strategy, aimed at reducing road accident fatalities and injuries.

A number of scheme priorities were identified:

1. The development of five inter-urban routes to motorway/high quality dual carriageway standard:
 - Dublin to the Border
 - Dublin to Galway
 - Dublin to Cork
 - Dublin to Limerick
 - Dublin to Waterford
2. A programme of major improvement works on other national primary routes
3. Completion of the M50
4. Construction of the Dublin Port Tunnel

This NDP was a critical plan, but it was not the only relevant national strategic plan during the decade.

National Spatial Strategy

The National Spatial Strategy endorsed the national road objectives, as set out in the NDP (2000-2006), as part of Government policy to create more balanced regional development.

Transport 21

The Government introduced Transport 21, towards the end of 2005. As its name suggests, it focused solely on the area of transport, including public transport (bus and rail specifically) and the road network. It identified a comprehensive development programme for the network of national primary and secondary roads for the period 2006 to 2015.

Transport 21 encapsulated all the work that was going to be done. In addition to the improvements already identified, it emphasised improvements to the Atlantic Corridor, and supported the National Spatial Strategy.

National Development Plan (2007-2013)

The National Development Plan (2007-2013) then evolved out of Transport 21 and the previous NDP.

This NDP confirmed the general objectives of the national road improvement strategy set out by its predecessor, i.e. delivering sustainable economic growth, greater social inclusion and balanced regional development. A fund of €54.6 billion was identified for investment in economic infrastructure, of which approximately €13.3 billion was to be invested in the national road network. The target was to remove the remaining infrastructure bottlenecks constraining economic development and deliver balanced regional development.

The NDP (2007-2013) confirmed the commitment to the inter-urban routes and, additionally, prioritised the development of the Atlantic Road Corridor.

This, then, was the genesis of the programme of extraordinary improvements to road infrastructure in the 2000s.

STORY 1: KILDARE BYPASS (M7) & MID-KILDARE AQUIFER

The Kildare Bypass was first conceived in the 1980s and, by 1990, the conditions in Kildare town were making such a bypass ever more necessary as over 12,500 vehicles a day passed through its streets. These caused pollution, congestion and safety issues and led to the town being known as one of the worst bottlenecks in the country.

As the Kildare County Council attempted to progress the bypass project it ran into a number of hurdles, resulting in a lengthy gestation period. These focused on environmental considerations, particularly:

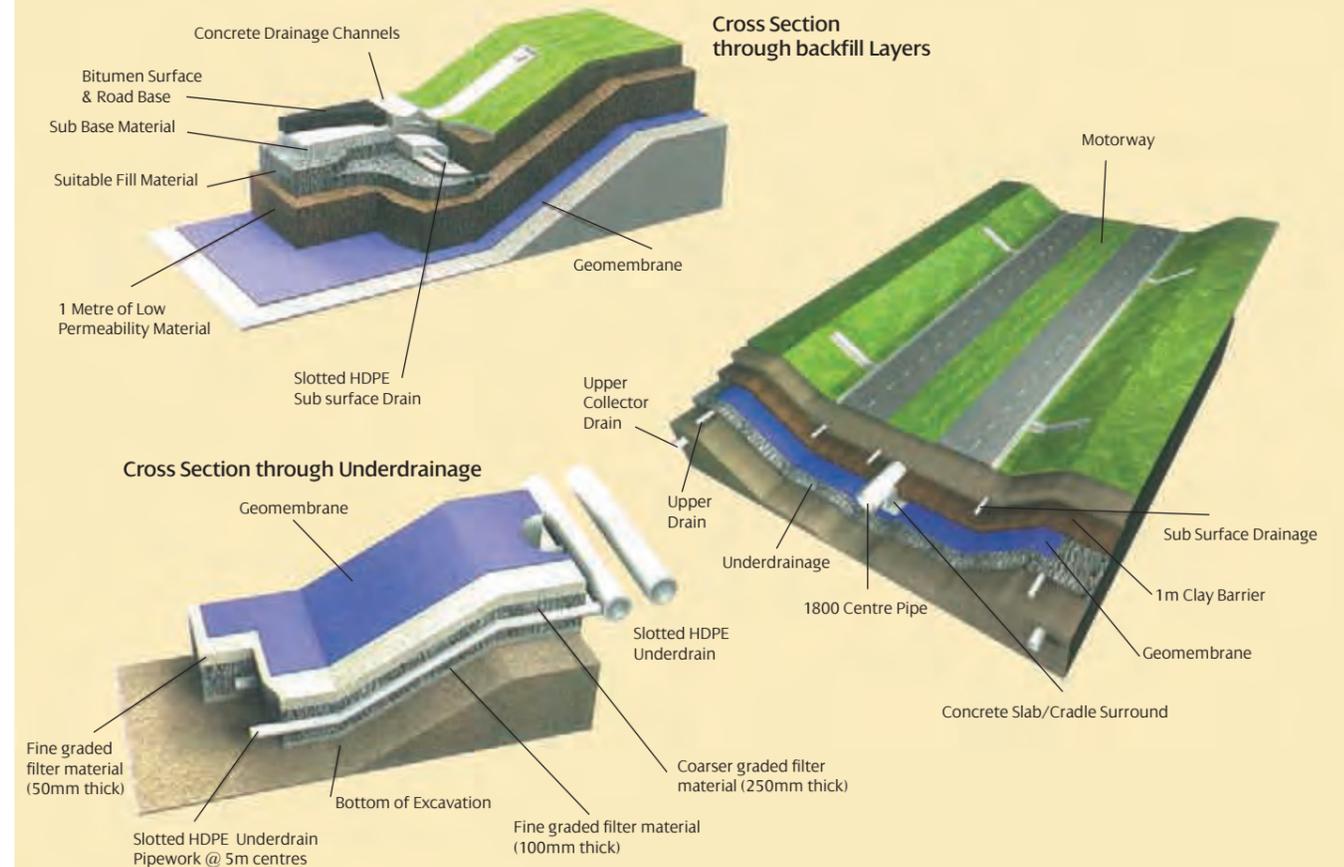
- The impact on hydrogeology and the knock-on ecological effects to the Curragh;
- The Mid-Kildare Aquifer, which covers an area of approximately 200 square kilometres and is the water-bearing strata in the Curragh region. It has a high water table and supplies Kildare town with water, as well as Pollardstown Fen and the surrounding region;
- Pollardstown Fen, which is an area of international ecological significance approximately 4 km north east of the town.

The planned bypass included a cutting as it passed Kildare town. This would minimise noise impacts on residents, visual intrusion on the landscape, as well as potential impact on the National Stud and Japanese Gardens.

When Ministerial approval for the scheme was given in 1996, it was given subject to two conditions: the motorway cutting would be raised by two metres to mitigate against the effects of drainage on Pollardstown Fen; and a monitoring programme would be established to further evaluate existing groundwater conditions.

The Minister's approval also required the implementation of any remedial measures necessary to protect the Mid-Kildare Aquifer, particularly with reference to Pollardstown Fen.

M7 Kildare Bypass.



The Curragh Aquifer/Kildare Bypass cross-section

Subsequent modelling of the aquifer and road construction, however, predicted that as a consequence of the cutting, groundwater levels would drop by as much as 30 cm in Pollardstown Fen. Natural, seasonal variations often saw groundwater levels in the Fen drop by 60 cm or more, but the effects of the motorway were seen as too severe. New solutions were therefore required.

Innovative Solution

Bearing in mind the conditions set and objections raised concerning the likely effect on the Fen, revised engineering designs were drawn up. The innovative solution adopted involved the 'tanking' of a 3.5 km section where the bypass came in contact with the Mid-Kildare Aquifer.

As part of the road construction, layers of material, including a reinforced bituminous geomembrane, were laid in the cutting and under the road to ensure that no water could access the road itself. The ground water level was lowered so that it flowed under the road through an 'underdrain'. The downward pressure of the soil and the road counters the upward pressure of the water to create stability, while still allowing the water to flow in its original direction. The under-drainage system is linked to an upper system to maintain the water table at a safe level on both sides of the road.

A layer of clay was added on top of the geomembrane to augment the waterproof barrier.

It was a complex process that called for expertise and considerable volumes of extra materials, including approximately 60 kilometres of pipework, 250,000 square metres of geomembrane and 250,000 cubic metres of low permeability clay.

Work on the bypass commenced in February 2001 and it opened to traffic in December 2003. Upon completion, it was estimated that the 13.2 km long Kildare Bypass removed up to 20,000 vehicles a day from Kildare town. Work on the bypass commenced in February 2001 and it opened to traffic in December 2003. Upon completion, it was estimated that the 13.2 km long Kildare Bypass removed up to 20,000 vehicles a day from Kildare town.



*Industrial Development
at Newhall Interchange
on M7 near Naas.*

DELIVERY

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The delivery of a large, complex national road programme of this scale required management of the programme delivery itself, and of the many institutional and political relationships essential for success. This chapter addresses, at a high level, some of these delivery management issues.

ORGANISATION

The Government, through the Minister for Transport (currently also Minister for Tourism and Sport), and the Department of Transport (currently also Tourism and Sport) is responsible for setting national policy with regards to transport matters and, in conjunction with the Department of Finance (currently the Department of Public Expenditure and Reform), directing public funding to the National Roads Authority. The Minister and the Department introduced and supported extensive beneficial legislation, such as amendments to the Roads Act and to the Planning and Development Act, and legislation to enable Public Private Partnerships. They provided critical support for major commitments such as for the buy-out of the Westlink PPP (see M50 Upgrade details in Chapter 3), and generally advised and supported the Authority in its dealings with other Departments, and with the Government.

The National Roads Authority is responsible for managing and improving the national road network, consisting of 5,313 kilometres of primary and secondary national roads, within the restrictions of the funding made available, and in compliance with national policies and Ministerial direction. The Authority, in relation to the delivery of the various national plans discussed in Chapter 1, was responsible for turning the aspirations into reality. The Authority established technical standards, guidelines and procedures for programme and project implementation, and managed a broad array of related activities ranging from transport economic analysis to environmental and heritage protection. The Authority was the programme manager, with the programme divided into manageable schemes or projects for planning, design and construction purposes.

The Roads Act, 1993, placed a legal obligation on the Authority to arrange, where possible, for many of its functions to be performed on its behalf by the relevant local authority. These included project planning and design, construction and maintenance works. Reliance on individual local authorities was an effective approach in the Authority's early years, until the demands of an expanding roads programme made it clear that far greater cross-county co-operation would be needed. To tackle this issue, the Authority and local authorities worked together to establish National Roads Regional Design Offices (NRDOs). Piloted in the mid-1990s, with the creation of four offices, the NRDOs were funded by the Authority and co-ordinated the activities of the relevant local authorities. They were directly involved in the planning and design of national road projects across county boundaries and in advancing them through the statutory approval process.

In 1999, following the Road Needs Study, and in anticipation of the significant road works expansion to come, the number of NRDOs was increased to eleven. At the same time, as part of the overall programme management strategy and in recognition of the scale of the road projects to be delivered, the role of NRDOs became more focused on project management. The planning and design work, for the most part, was taken on by consulting engineers.

The NRDOs acted as a vital bridge between the local authorities and the National Roads Authority. The approach proved highly successful, and it stimulated co-operation and expedited the planning and construction process across all projects, encouraging everyone involved to work together to achieve common goals. In fact, subsequent to the major road-building programme a regional office structure is being continued for network operations and management purposes.

While the NRDOs managed the majority of the individual schemes directly, the Authority contracted directly for Public Private Partnerships, in view of their contractual and financial complexities.

There were many other State organisations involved. The Department of the Environment, Heritage and Local Government (DoEHLG) had particular roles in relation to archaeological discoveries and environmental protection. Two State bodies under the aegis of the DoEHLG were also intimately involved – the National Museum with regards to archaeology, and An Bord Pleanála with regards to statutory approval from a planning and development perspective. Many other State bodies were also involved in aspects of the programme, such as the National Parks & Wildlife Service, Inland Fisheries Ireland, Office of Public Works (OPW) and Fáilte Ireland.

The private sector provided most of the expertise and resources necessary to execute individual schemes, as most of the planning studies, the engineering, the archaeological investigations and the construction were carried out by private sector companies. The list of companies and organisations involved is long, but the Association of Consulting Engineers, Engineers Ireland, and the Construction Industry Federation, in particular, represented the majority of the participants in delivery, while the Irish Farmers' Association worked hard on behalf of landowners.

Many of the consulting engineers and the contractors formed joint ventures or alliances with international counterparts in order to develop improved capabilities, and to avail of resources beyond those available in Ireland. As the decade progressed, so did the capabilities of the indigenous companies, and by the end of the decade they were able to undertake the most complex projects.

FUNDING

The cost of improving the national roads network from 2000-2010 was almost €16 billion.

There were three principal sources of funding:

1. Exchequer Funding
2. EU Funding
3. Public Private Partnership Funding

1. Exchequer Funding

The Exchequer provided over €13.6 billion of funding to the Authority during this period. The European Union reimbursed about €1 billion of this, and the Exchequer also benefitted from tax returns, particularly Value Added Tax and payroll taxes, so that the real cost to the Exchequer was somewhat less than the headline cost.

The practice is that the Oireachtas votes for the allocation of Exchequer funds to the Department of Transport on an annual basis. The Department in turn allocates the funds to the Authority, and the Authority allocates its funding to a wide range of programmes and projects. Traditionally there had been no commitment as to the level of funding that might be available in subsequent years, and as major projects involved multi-year spending commitments, this caused difficulty in matching expenditures and budgets.

A new approach was needed to allow long term programmes to be delivered efficiently, and the Government introduced a rolling five year funding plan, outlining the levels of capital financing that would be made available over this longer period. Whilst the actual funding rarely corresponded exactly to the rolling five-year plan, it greatly facilitated the more effective management of the roads programme. Importantly, the consulting engineers, contractors and suppliers developed confidence in the pipeline of work, and invested in training and resources.

The Exchequer funding for national road improvement and renewal works was as follows:

Year	Amount (€ millions)
2000	622,129
2001	908,236
2002	1,083,499
2003	1,169,145
2004	1,178,959
2005	1,263,636
2006	1,582,500
2007	1,712,706
2008	1,599,577
2009	1,443,400
2010	1,114,000
2011	674,000

2. EU Funding

The EU has contributed to the building of Ireland's infrastructure for decades, right back to when Ireland joined the EEC (as the European Union was then known) in 1973. There were two key funding programmes relevant to national roads during the 2000s:

- The Cohesion Fund
- The European Regional Development Fund

Cohesion Fund

Established under the Maastricht Treaty, the objective of the Cohesion Fund is to reduce regional disparities by encouraging greater cohesion and equality between all Member States. Eligibility is restricted to those Member States whose per capita GNP is below 90% of the Community average; these States are required to have a programme in place designed to achieve the requisite conditions of economic convergence.

Ireland received funding through the Cohesion Fund until 2006, when the GNP threshold was exceeded. At that point the country no longer qualified.

European Regional Development Fund (ERDF)

The objectives of the European Regional Development Fund (ERDF) are similar to the Cohesion Fund, although the ERDF has a wider remit both in terms of eligibility and purpose. The Fund is intended to bring cohesion by: creating sustainable jobs; promoting regional competitiveness through innovation and knowledge; and encouraging cross-border economic and social and environmental activities. In order to achieve these goals the Fund is accessible by every Member State and not limited by reference to GNP levels.

Investment in Ireland's roads was intended to help offset the impact of Ireland's peripheral location within the European Union, and to improve the competitiveness of the Irish economy by reducing transport costs. During the decade, over 70 major national road schemes received ERDF assistance.



Other EU Funding

A number of other EU sources provided funding, although to a lesser degree. These included TEN-T Funding, Interreg 111A/IVA Funding, and the Border-Midlands Western (BMW) Regional Operational Programme 2007-2013.

The EU contributed in the order of €1 billion during the decade, with payments made directly to the Department of Finance partially reimbursing allocations that had been made to the Authority.

3. Private Sector Funding

Public Private Partnerships are used successfully throughout much of the world as a means of providing public infrastructure. Typically, the PPP entity finances, builds, maintains and operates the infrastructure under a long term contract, and the State reimburses the PPP entity through a combination of direct payments, and by authorising user charges such as tolls. Tolloed roads had been widely used in Ireland in earlier centuries, but had fallen out of use. It was decided that PPPs would be used to bridge a funding gap between available public sector funding and the funding required, and also to bring world-class infrastructure operators into the Irish market.

A target of €1.27 billion in private financing was targeted initially, but as the first schemes were so successful this target was increased to €2 billion.

Contracts were entered into for PPPs for in excess of this €2 billion private sector funding target, by 2006, and all of the PPPs were open to traffic by 2010. The PPPs, in turn, were funded through participants' equity, by borrowings from the European Investment Bank, from commercial lenders, and in one instance through a bond issue.

During the period 2000-2010, ten PPPs were completed:

- N25 Waterford Bypass
- N18 Limerick Tunnel
- N1/M1 Dundalk Western Bypass
- M3 Clonee to Kells
- M4/M6 Kilcock - Kinnegad
- N6 Galway to East Ballinasloe
- M7 Portlaoise - Castletown/M8 Portlaoise - Cullahill
- M8 Rathcormac - Fermoy Bypass
- M50 PPP Scheme
- Tranche 1 Motorway Service Areas

PROJECT MANAGEMENT

The Authority developed project management guidelines for use on all of its major schemes, in order to bring clarity to roles and responsibilities, to incorporate best practices and to ensure consistency across the programme.

These guidelines were accompanied by guideline-related project activities such as cost management and value engineering.

The core objectives of the guidelines are:

- Follow a phased approach to road scheme development, confirming with each phase that the underlying objectives are being achieved and that the costs are under control.
- Minimise any adverse effects on the environment, and comply with all statutory requirements.
- Deliver value for money.

The guidelines allow for extensive public consultation – much more than is legally required – which ensures an open approach to the road planning process.

Essentially, the phases embrace a ‘Concept to Completion’ evolution, and are divided into two sections:

Phases 1 to 4: Planning & Design of Scheme, up to and including the Statutory Procedures.

Phases 5 to 7: Tender & Award, Construction & Closeout.

A synopsis of each of the seven phases is provided below:

Phase 1 Scheme Concept & Feasibility Studies

Phase 1 focuses on the precise need for a new road (or road improvements). Why is it needed? What scale should it be? Such questions can be answered by carrying out a feasibility study on the need for the scheme, unless it has already been identified as being necessary under Government Programmes/Policies.

At the same time, the relevant key players who will be involved throughout the seven phases are identified. These typically include the Authority, local authorities, NRDOs and consultants from a range of specialist areas. Roles and responsibilities are designated, including what each organisation is expected to deliver and their reporting requirements.

Phase 2 Route Selection

With the need for a road improvement identified, the next step is to consider the broad Study Area through which the road will pass. Every landscape is different, with towns and villages to be considered, along with mountains and rivers as well as archaeological sites and designated environmental habitats. These constraints are first identified before a number of feasible route alternatives are put forward. The design team assesses the existing road corridor to establish whether an improvement, such as road widening, will address the needs in the future. This is sometimes described as the ‘on-line’ option(s). The team will also assess possible ‘off-line’ or greenfield options/routes. Each option is designed to minimise the impact on the environment, based on the physical constraints.

The route options and constraints are included in a Route Corridor Report. Public information sessions are organised, where the public has the opportunity to see the potential routes and to highlight their concerns and special interests. This is not a legal requirement but it allows the public to gain a better understanding of the processes and selection criteria involved.



N12 Route Selection, Limerick.

Route options are assessed on a number of key criteria, including safety, land use, environmental impact (such as archaeology, local communities, flora & fauna), engineering, economics and traffic usage.

These criteria are used to identify the Preferred Route Corridor.

Phase 3 Design

The Preferred Route Corridor is developed further, with a comprehensive design offering sufficient levels of detail to determine how much land along the corridor will need to be taken, what vertical and horizontal alignments will be adopted for the road and what, if any, environmental issues exist. The design may also help to identify junction types, bridge requirements, etc. This level of detail is needed before the proposals move into the statutory process in Phase 4.

The design will also lead to the development of a more robust scheme budget and will include an initial Road Safety Audit to identify any potential safety issues.

Phase 4 The Statutory Process

The next phase involves obtaining approval of the Environmental Impact Assessment and of the Compulsory Purchase Order from An Bord Pleanála.

The public and other parties can comment/object to the plans as part of the statutory approval process. An Bord Pleanála usually decides to hold a hearing to address the concerns raised and to help determine whether the road can proceed as presented, or whether conditions should be imposed. The purpose of this phase is to confirm that the road scheme satisfies planning and environmental, legislative and procedural requirements.

Phase 5 Advance Works and Construction Documents Preparation, Tender and Award

This phase concerns the tendering for the preparatory works and for the construction. There will be numerous organisations involved in the road construction and a number of advance contracts may be put in place, particularly for bigger or complex schemes. These cover matters such as site clearance, utilities, archaeological surveys and resolution activities. Notices to treat are served on landowners and these pave the way for the commencement of the compensation process, as well as all necessary accommodation works.

The State previously utilised unit price (or re-measurement) contracts for construction, but the Authority migrated to Design-Build fixed price contracts in the mid-2000s. These have now become the standard fixed price contracts for most public construction work. The Authority has also piloted the use of Early Contractor Involvement contracts, which proved very successful.



Bridge Construction M7 Nenagh to Limerick.

Phase 6 Construction & Implementation

The construction of the scheme is carried out by the main contractor, who is also responsible for detail design. The consulting engineer provides a detail design review and on-site supervisory teams, all of which are under the overall direction of the local authority/National Roads Authority. The final Road Safety Audit is conducted before the road is opened to traffic.

Phase 7 Handover, Review & Closeout

The road is opened to traffic but there are usually a number of issues still to be addressed, such as construction completion, demobilising, finalising accounts, and dealing with any conciliation/arbitration issues that may have arisen. The maintenance period, usually of two years, begins once the road is opened. During this period the contractor is required to correct any defects that may be identified once traffic is using the road. Following closeout, a review of the scheme is conducted to see what lessons can be learned and what areas require improvement.

The guidelines are revised to reflect the lessons learned. As a result, they include current best practices in the areas of planning and design, and scheme appraisal requirements.

LAND ACQUISITION

The acquisition of land for road schemes is normally done through a compulsory purchase system, whereby An Bord Pleanála authorises the Authority or the local authority to acquire the necessary land, whether or not the landowner is willing to sell. Compensation to the landowner is then determined by negotiation or, failing that, by assessment or by a State Arbitrator.

Typically, the local authority was responsible for the negotiation of price and accommodation works with landowners, but the Authority was also involved to ensure consistency of valuations, improved budget management and greater transparency. The cost of land was also going to be significant, and failure to provide site access could have led to delay and construction disruption. The Authority employed land acquisition experts to help overcome these challenges and introduced procedures to track the price of land and property throughout the country. This provided current, comparative pricing wherever land acquisition was required.

Irish Farmers' Association Agreement

With so much of the new road network passing through green field sites, the Irish farming community was going to be significantly affected by the new road building activities. The Authority participated in negotiations with the Irish Creamery Milk Suppliers Association, and the Irish Farmers' Association (IFA). There were difficulties and delays to road programme activities as negotiations continued, but a welcome resolution was secured in December 2001. The resultant agreement between the Department of the Environment & Local Government, the IFA and the Authority established additional arrangements and procedures relating to compulsory land acquisition, which were supplementary to those provided in legislation, and facilitated the delivery of the roads programme. The new arrangements addressed the valuation of land, provided for a goodwill payment to farmers, and established an assessment procedure to make recommendations on compensation where agreement could not be reached through negotiation. Procedures were also introduced aimed at streamlining the making and payment of compensation claims.

Code of Practice & Guide to Process

Following on from the 2001 agreement, the Authority produced a Guide to Process and a Code of Practice for Land Acquisition.

The Guide to Process was designed to inform people affected by national road scheme proposals of the procedures involved, the arrangements to be followed by local authorities in their dealings with the individuals concerned, and the legislative and other entitlements of individuals.

The Code of Practice dealt with issues ranging from the planning of national roads to post-construction. Particular emphasis was placed on:

- Arrangements for access to land for investigative work
- The manner in which compensation was determined
- Procedures to minimise disruption and other effects caused by road building and post-construction
- The prevention of the spread of animal disease.

The Authority consulted extensively with the farmer representative associations in the preparation of the Code.

Land costs increased significantly as a result of the economic boom that lasted until 2008. In particular, urban land and land that had any prospect of being developed increased substantially in cost. Between 2000 and 2010, 25,000 acres of land were acquired for the national roads programme. The cost of this land was €2.75 billion.



N7 Limerick Tunnel PPP

TECHNICAL GUIDELINES AND STANDARDS

The Authority sets the engineering standards to be used on national road schemes and, as the programme evolved, guidelines and standards were also developed for other disciplines, such as for environmental matters and archaeology. These include:

- NRA Design Manual for Roads & Bridges (NRA DMRB)
- Environment
- Archaeology

NRA Design Manual for Roads & Bridges (NRA DMRB)

A design manual produced by the National Institute for Physical Planning and Construction Research (An Foras Forbartha Teoranta) was used as part of the road design process during the early 1990s. This addressed rural single carriageways, but not the motorways and more complex designs which were to follow. As the national roads programme picked up pace through the 1990s, the Authority focused on creating a new manual which would promote quality and consistency of approach to the design of more complex road and bridge projects.

This gave rise to the NRA DMRB, which was introduced in 2000. It established a comprehensive set of design standards and specifications to provide clear guidance for the design of road and bridge projects. It drew heavily on the equivalent UK standards. As the 21st century got underway it meant that contractors, designers, local authorities, and National Road Design Offices followed the same set of highly prescriptive guidelines.

This manual set out the technical standards for the national roads programme, in areas such as geometric design of grade separated junctions, road pavements and the structural design of bridges. The NRA DMRB ensured that contractors built the roads and bridges to identical specifications and to the same high quality. This was of critical importance when the Design-Build contract form was adopted for the motorway and dual carriageway projects constructed from 2000 on.

The manual is updated and maintained on a regular basis by the Authority, which also monitors international trends and practices to ensure the manual is as up-to-date and relevant as possible.

The move to EuroCodes and the use of Design-Build contracts, rather than Employer-design contracts, are example of events that required major revisions to the NRA DMRB.

Environment

The Authority has adopted a highly proactive approach to environmental protection, and from the outset it adopted practices and procedures that ensured environmental considerations were integrated into all aspects of road planning and construction.

Environment Unit

The Authority established an Environment Unit with the aim of achieving best practice procedures and ensuring consistency of approach and compliance with environmental legislation, while also attempting to minimise adverse environmental effects.

The Authority's National Roads Project Management Guidelines placed an emphasis on the identification and avoidance of environmental impacts during the early stages of project planning and design. The Environment Unit supported this approach by producing an extensive range of best practice guidance that also addressed the construction and operation phases of national road schemes.

Environmental Integration Model

The Environment Unit produced a four-phase strategy – called the Environmental Integration Model – which embraced the road building process from start to finish.

This model supports the Environmental Impact Assessment (EIA) legal framework and addresses all environmental issues, covering mammals, birds, fish, waterways, woodlands and flora and fauna, as well as light, noise and air pollution.

In order to implement this strategy, the Authority developed Guidelines for the Creation, Implementation and Maintenance of an Environmental Operating Plan (EOP). The EOP relates specifically to the main contractor responsible for the construction life cycle of a national road scheme project. It outlines procedures for the delivery of environmental mitigation measures and for addressing general day-to-day environmental issues that can arise during the construction phase. EOPs have to be produced, implemented and maintained by all contractors engaged in the construction of national road schemes.

The four-phase strategy process:

1. Integrates environmental considerations into national road scheme planning and development to underpin the effectiveness of the Project Management Guidelines.
2. Provides best practice construction guidelines to mitigate impacts which were identified and assessed during the EIA process.
3. Ensures the implementation and auditing of environmental measures on national road schemes by the main contractor for the construction life cycle of the project, to ensure compliance with the conditions of scheme approvals.
4. Requires post-EIA evaluation studies for a range of environmental issues with the aim of refining procedures and priorities in the light of experience.

The model incorporates all legislative requirements and national and international best practice policies.

Some examples of environmental measures implemented as part of national road schemes are listed below:

- The *Scirpus triquetus* (Triangular Club-rush) was moved and harvested on the River Shannon, for the Limerick Tunnel scheme. A temporary site was created which replicated the Shannon's tidal action, ensuring the *Scirpus* survived and thrived before it was returned to its original habitat some years later.
- A captive breeding programme was developed for the Nore Pearl Mussel on the M7 Portlaoise to Castletown/M8 Portlaoise to Cullahill scheme. The mussel is sensitive to sediment and the Pearl Mussel had stopped breeding in the area of potential impact. This programme ensured that breeding recommenced.
- Roosting houses were introduced for the Lesser Horseshoe Bat. One such location was an old schoolhouse which became home for over 20 bats.
- Mammal underpasses, mammal resistant fencing, artificial setts and holts for the protection of badgers and otters were introduced on new road schemes. Fish pass facilities on bridges and culverts were included on all schemes crossing salmonid waters.

Archaeology

The construction of new roads inevitably leads to the unearthing of archaeological discoveries. Construction activities can be very significantly delayed and disrupted if discoveries occur after construction mobilisation, while carrying out archaeological investigations under the pressure of construction schedules is best avoided.

The Authority approached the Department of Arts, Heritage, Gaeltacht & the Islands, and the National Museum of Ireland, to identify how traditional processes could be improved on a mutually acceptable basis. All archaeological issues were addressed (e.g. investigation techniques, timelines, reporting channels) as part of subsequent comprehensive discussions.

A Code of Practice was agreed between the Authority and the Minister for Arts, Heritage, Gaeltacht & the Islands, in June 2000. The purpose of this was twofold: to provide a framework within the existing legislation which spelled out the responsibilities of the Authority and the Minister's Department; and to promote policies which would enable the Authority to progress its programme of work within the timescale of the NDP.

The Code of Practice established a template which was later adopted for similar codes agreed between the Department and other State agencies engaged in activities with the potential to impact on archaeology. These included Bord Gáis, Irish Rail and Bord na Móna.



The new Code of Practice allowed the Authority to become far more pro-active in its approach to the archaeological element of road planning.

Project archaeologists were appointed to the Authority and local authorities, who developed and oversaw a consistent approach to the procurement of archaeological services – from the initial consideration of road scheme proposals, right through to submission of full excavation reports and, where appropriate, full publication.

Under the new approach, archaeological investigations were conducted prior to road construction. Extensive areas were assessed, using offset trenching on a very broad scale. This was combined with geophysical surveys and landscape assessments to identify high risk areas (e.g. bogs, or townlands with specific names). Together, these procedures allowed for comprehensive investigations of the area, ensuring that most potential sites were identified before road construction began.



Archaeological Site Survey.

Archaeological Discoveries

There were up to 1,500 archaeologists engaged on national road schemes during peak periods of road building activity. Many major archaeological discoveries were made and these allowed Ireland and her communities (and diaspora) to gain a better understanding of the country's heritage, history and ancestry. Between 2000 and 2010, over 2,000 archaeological excavations took place on road schemes.

A small sample of discoveries is listed below (see also the panel on Woodstown on page 77):

Clowanstown	Mesolithic fish baskets discovered on the M3 Clonee to North of Kells.
Lismullin	Iron Age ceremonial post enclosure discovered on the M3 Clonee to North of Kells.
Edercloon	Trackways discovered on the N5 Dromod/Rosky scheme and the earliest wheel found in Ireland.
Kilbegly Mill	An extremely well preserved horizontal watermill was discovered on the N6 Ballinasloe/Athlone scheme.
Owenbristy	Early medieval burial discovered on the N18 Gort/Crusheen scheme.
Mullamast	A deserted medieval village was discovered on the M9, near Athy.
Carrickmines Castle	Post-medieval fortifications of Carrickmines Castle were discovered on the M50 South Eastern Motorway scheme. These were excavated and preserved.

When archaeological sites of significance came to light, they were addressed in the context of the Code of Practice. Such archaeological sites were treated in one of three ways:

1. Preservation by Avoidance: The road route is changed to avoid the site, as happened at Woodstown on the Waterford City Bypass, and along the M3 in a number of places.
2. Preservation in Situ: once information is gathered, an engineering solution is employed to preserve sites where they exist, in order to allow the road to pass over them, e.g. Carrickmines on the M50.
3. Preservation by Record: A full record of the site is delivered, ensuring that the Authority, the National Museum of Ireland and the Department of the Environment, Heritage & Local Government all hold these records.

Access to Archaeological Discoveries

When archaeological finds were 'removed' for preservation purposes, the information and knowledge gleaned from the discovery were carefully recorded and disseminated. The Authority ensured that the local community concerned, and all other interested parties, had access to information on these finds. This was done in a number of ways, including seminars organised or supported by the Authority; publication of scheme monographs; Seanda, the Authority's Archaeology Magazine; and arrangements which promoted the display of artefacts from national road schemes in the National Museum of Ireland and regional museums.

STORY 2: THE BALLYNAHATTIN BRIDGE 'SLIDE'

M1 Dublin to Belfast Railway Crossing

The Dundalk Western Bypass crosses the Dublin to Belfast railway in the townland of Ballynahattin. It was proposed that the M1 motorway would pass beneath the railway, which sat on an embankment over 15 metres in height.

This immediately presented a number of challenges but the contractor, Iarnród Éireann and the Authority devised an innovative solution that would cause minimal disruption to train operations. The solution was to 'slide' a bridge into place, leaving the track in its existing position. As such, the bridge would be located within the height and width of the existing railway embankment.

How It Was Done

The new Ballynahattin railway bridge was pre-constructed over a four month period, next to the existing crossing. When construction was finished, Iarnród Éireann granted a four day track possession to the contractor (over the 2005 Easter weekend), to allow the final works to be completed and the bridge to be moved into position. At this stage train services over the bridge were suspended.

The whole operation required careful planning over the 72 hour period: the removal of 23,000 cubic metres of clay embankment, to create a gap for the new bridge to fit into, was comfortably achieved on Day 1; the bridge was then pushed into position during Day 2; and all finishing and reinstatement work was completed on Day 3. The track was then handed back to Iarnród Éireann and re-opened after the holiday weekend as planned. The system employed to move the bridge into its final position was a proprietary French technique called Autoripage, which had not been used in Ireland before.

This technique required the bridge and its base to be constructed on a guide raft, which initially supported the structure. The raft then provided directional guidance and an anchorage against which six hydraulic jacks pulled. The jacks were deployed for this 'bridge push'. The four span, skewed bridge of 84 metres was pushed a total distance of 44 metres to its final position. This was achieved in just 10 hours, at speeds of up to 6 metres an hour. It was a highly complex challenge that required the co-ordination of many organisations, manufacturers, suppliers, sub-contractors and specialists. The structure weighed 7,500 tonnes, and was, at the time, the biggest structure in the world to be pushed into place by the Autoripage method.



Ballynahattin 'Slide' Bridge Construction

THE ROAD PROGRAMME

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The National Roads Authority was responsible for over 100 major road schemes being completed over the course of the decade. This chapter provides more detailed information about these schemes.

All told, over 1,200 kilometres of motorway and over 400 kilometres of single carriageway and link roads were built between 2000 and 2010. More than 600 bridges were constructed, including spectacular river crossings, and some 100 grade separated junctions were built to ensure the smooth operation of the motorways.

The schemes fall under two key headings:

- Major Inter-Urban (MIU) motorways
- Other Major National Road Schemes

INTER-URBAN ROUTES

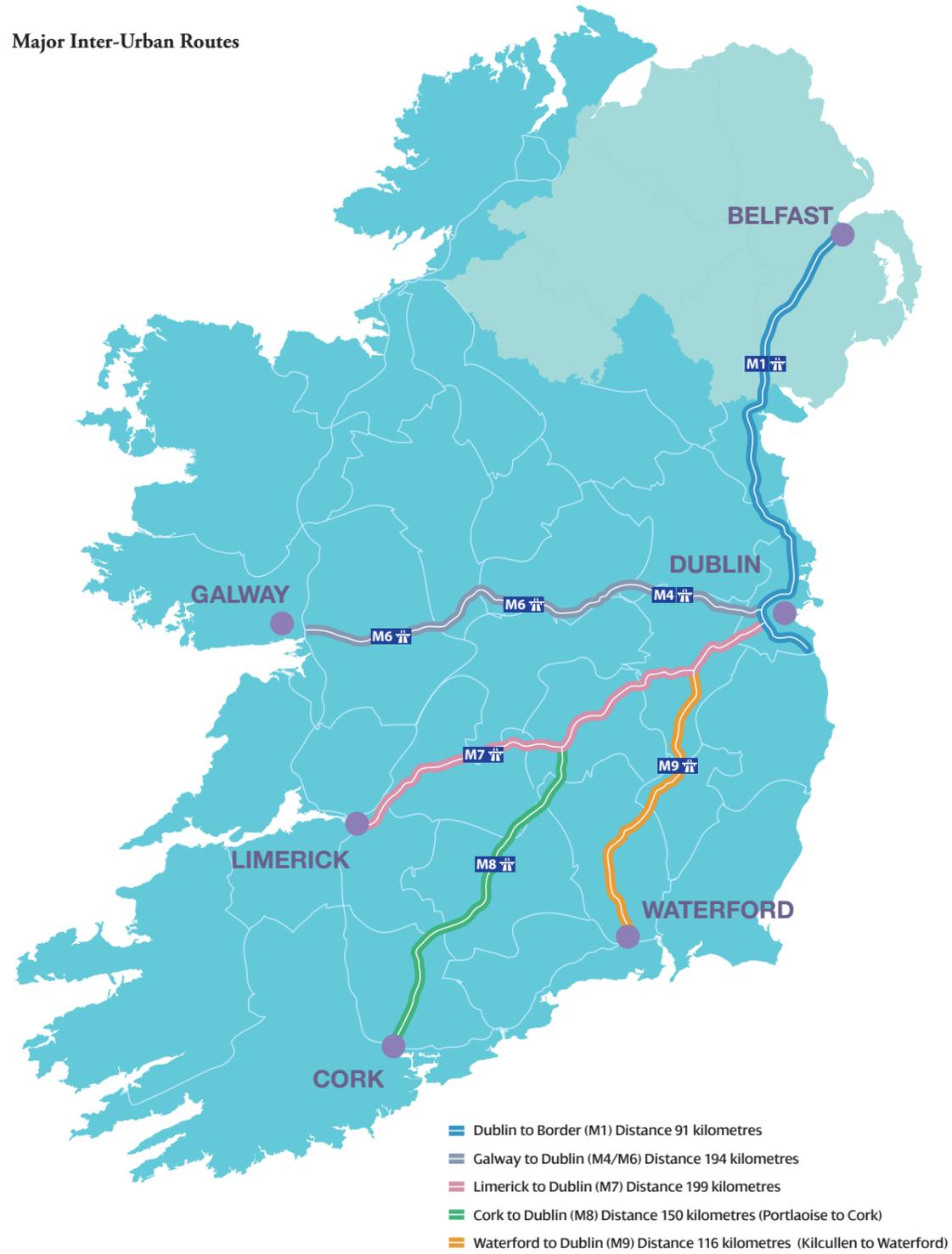
From the beginning there were five inter-urban routes identified as being of critical importance, connecting Dublin with the other major cities in Ireland: Belfast, Cork, Galway, Limerick and Waterford.

These routes alone cost a total of €8 billion to develop, as follows:

Planning & Design	€240 million
Land & Property	€1,460 million
Archaeology	€120 million
Construction	€5,560 million
Sub-Total	€7,380 million
V.A.T.	€620 million
Total	€8,000 million

THE PRIORITIES FOR
UPGRADING IRELAND'S
ROAD NETWORK
FOCUSED FIRST AND
FOREMOST ON THE
FIVE INTER-URBAN
ROUTES

Major Inter-Urban Routes



M1 (Dublin to Border) – Distance 91 kilometres

The M1 was the first of the inter-urban routes within the Republic to be completed in its entirety. When the motorway between Dundalk and the Border was opened in August 2007, it created a continuous 91 km stretch of motorway on the Dublin to Belfast corridor. Roads Service Northern Ireland similarly developed the route from the Border to Belfast, giving an excellent road linkage from Dublin's M50 to central Belfast.

There had been a long-held vision of upgrading the Dublin to Belfast route as it is the most important economic corridor in the country, and it formed part of Euroroute E01 from Larne to Rosslare.

Work along this route had been sporadic, dating back to the 1980s and 1990s, with the 10 km Dunleer Bypass (1993) and 13 km Balbriggan Bypass (1998) among the earlier schemes. By 2000, work had already begun on the 17 km Dunleer to Dundalk scheme.

The M1 passes through the counties of Dublin, Meath and Louth, bypassing Swords, Balbriggan, Julianstown, Drogheda, Dunleer, Castlebellingham and Dundalk. A journey from Dublin to Belfast, that once took up to four hours, takes just over two hours today.

Due to the scale of work involved, the motorway was built in the following stages:

- | | |
|--|---------------------------|
| A. Cloghran to Lissenhall | D. Dundalk Western Bypass |
| B. Lissenhall to Balbriggan | E. Dundalk to the Border |
| C. Drogheda Bypass (Gormanston to Monasterboice) | |

The Dundalk Western Bypass was funded through the PPP mechanism.

M1 Developments

Meeting at the Border

An historic day was reached on 2nd August, 2007, when the 14 km A1/M1 Newry to Dundalk dual carriageway scheme was officially opened at the Border crossing between the Republic of Ireland and Northern Ireland. The completion of the Newry to Dundalk scheme was jointly managed and was a model of co-operation between the National Roads Authority, Louth County Council and Roads Service Northern Ireland.



*M1 Broadmeadow Estuary
near Swords.*

A. CLOGHRAN TO LISSENHALL & B. LISSENHALL TO BALBRIGGAN

When these two schemes were opened in June 2003, they completed the M1 from Dublin as far as Dundalk. Combined, they link the existing M1 motorway at Dublin Airport to the Drogheda Bypass, bypassing Swords. The scheme includes interchanges at Cloghran and Lissenhall, as well as the Drinan interchange (added in 2005). The section of the old N1, between Cloghran and Lissenhall, carried traffic volumes ranging from 36,000 per day at Blake's Cross, to 68,000 at the Dublin Airport roundabout. The M1 now carries the majority of this traffic.

Construction

The 6.5 km Cloghran to Lissenhall scheme commenced in August 2000, while the 10 km Lissenhall to Balbriggan scheme started in July 2001. They both opened on the same day in June 2003.

Environment & Archaeology

Nine bridges were constructed as part of the Cloghran to Lissenhall scheme. These included an elevated bridge of 320 metres over the Broadmeadow Estuary. The bridge design paid particular attention to the environmental importance and sensitivity of the estuary, and a 6.3 metre gap was introduced to separate north and south decks. This helps natural light to filter through to the estuary below, thereby minimising the impact on aquatic life.

C. DROGHEDA BYPASS (GORMANSTON TO MONASTERBOICE)

The 21.5 km stretch of motorway runs between Gormanston and Monasterboice, linking the Balbriggan Bypass and the Dunleer to Dundalk motorway. The new road bypasses Drogheda, Julianstown and Monasterboice. There are four interchanges for traffic (Gormanston, Drogheda South, Drogheda North, and Monasterboice), and 24 bridges, including Ireland's first cable-stayed bridge over the River Boyne (see page 78).

Toll plazas are located at Balgeen, 7 km south of Drogheda, and at Rathmullen.

Construction

Construction began in the Spring of 2000, and opened to traffic in June 2003, removing 15,000 vehicles a day from Drogheda's town centre.

Environment & Archaeology

The Eastern Regional Fisheries Board was consulted regarding potential impacts on salmon, swans, herons and kingfishers in the River Boyne and on Yellow Island. These were carefully protected through the innovative design and eventual construction of the Boyne Bridge.

The route of the motorway passes through Drogheda's hinterland, where virtually all upstanding archaeological sites have been destroyed by a thousand years of intensive ploughing. During construction, a total of 200 archaeologists were on site revealing a rich archaeological landscape that had long been hidden.

Discoveries date back to the Neolithic Age. Four buildings at Balgatheran represented the first clear evidence from Ireland of domestic houses built by people who used Late Neolithic pottery called 'Grooved Ware'. Underneath a tree planted on a clearance cairn in Claristown, a Late Iron Age roundhouse was discovered. This had subsequently been transformed into a Late Iron Age - Early Medieval ring-cairn monument. The site was set in the middle of a plateau, centrally located between the Nanny and Delvin rivers, looking out towards the Irish Sea. The roundhouse was built around 100 BC to 50 BC.



D. DUNDALK WESTERN BYPASS

The Dundalk Western Bypass is 11 km in length, joining the Dunleer to Dundalk motorway with Ballymascanlan, to the north of Dundalk. It was a PPP scheme and the contract includes the operation and maintenance of the 43 km stretch of motorway between Dundalk and Gormanston.

Construction

Construction began in February 2004, and was completed in September 2005.

Environment & Archaeology

Badger and otter surveys led to the provision of an extensive network of mammal underpasses and badger exclusion fencing. At river crossings, construction focused on minimising both the short and long term implications for fish and other aquatic species.

Significant archaeological finds on this scheme included two prehistoric sites (a henge at Balregan and a cist-barrow cemetery) and three Early Medieval souterrains, or underground passages. One of these souterrains, at Tateetra, was 75 metres in length. The entrance was through a chamber, secured by a door framed with massive, granite stones. The door could be secured internally by a cross brace.

The site is situated on a bank overlooking the Castletown River, opposite the henge excavated at Balregan. The Balregan henge was part of a very large archaeological complex comprising many stone circles, cairns and other monuments. These stones had been sourced for use in the souterrain. One stone had an elegant 'megalithic art' lozenge motif dating to c. 1800 BC, while two stones were of Early Medieval date. The first was a possible altar marked with five Greek crosses, while the second was a large slab cut with a simple Latin cross.

The souterrain was meticulously exposed, recorded, protected and reinstated.

E. DUNDALK TO THE BORDER

The 14 km link between the Dundalk Western Bypass and the Newry Bypass was the final stage of the M1 motorway between Dublin and the Border. The scheme was a cross-Border project with 9.4 km in county Louth, and 4.6 km of dual carriageway in county Armagh.

Construction

Construction began in June 2005, and was completed in August 2007, three months ahead of schedule.

Environment & Archaeology

Environmental considerations were an important aspect of the project as it was located within the Ring of Gullion Area of Outstanding Natural Beauty. The scheme therefore included mitigating measures relating to noise, landscaping, water quality and the protection of wildlife. Although this area had been extensively studied for its standing Neolithic remains, the wealth of finds uncovered through archaeological work was spectacular, representing a period from 4000 BC until around 1000 AD.

*Ballymascanlan Roundabout
under construction*



*M1, Faughart Lower
North of Dundalk.*

M4/M6 MIU (Dublin to Galway) - Distance 194 kilometres

The Dublin-Galway route was completed by the opening of the 56 km section between Ballinasloe East and Galway City on 18th December 2009. The route is mainly motorway, except near the M50, and around Athlone.

The journey from Dublin to Galway used to take up to four hours, but now takes less than two hours. Similarly, journey times between the midlands and Galway or Dublin have been greatly reduced. The new road passes through seven counties and bypasses 16 towns and villages, all of which had become bottlenecks during peak travel times.

Following the construction of the three bypasses built during the 1990s (Athlone Bypass (1990) and the Maynooth and Lucan bypasses (1994)), the Authority divided the rest of the route into five sections for planning, design and construction purposes.

- | | |
|-------------------------------|------------------------------------|
| A. Kilcock to Kinnegad (M4) | D. Athlone to Ballinasloe (M6) |
| B. Kinnegad to Kilbeggan (M6) | E. Ballinasloe East to Galway (M6) |
| C. Kilbeggan to Athlone (M6) | |

Two of these sections - Kilcock to Kinnegad and Ballinasloe East to Galway - were built through Public Private Partnerships (PPPs).

One of the benefits of the new road was to remove traffic from the local towns and villages, thereby reducing travel times while also improving the environment and quality of life in the bypassed communities. As an example, Rochfordbridge experienced AADT (Annual Average Daily Traffic) of 11,600 before the motorway was built; this fell to 2,700 AADT after its construction, a reduction of 76%. In another sign of the success and importance of the motorway, the AADT on the stretch of motorway which bypassed Rochfordbridge rose considerably above expectations, to 18,000, within a few years of opening.

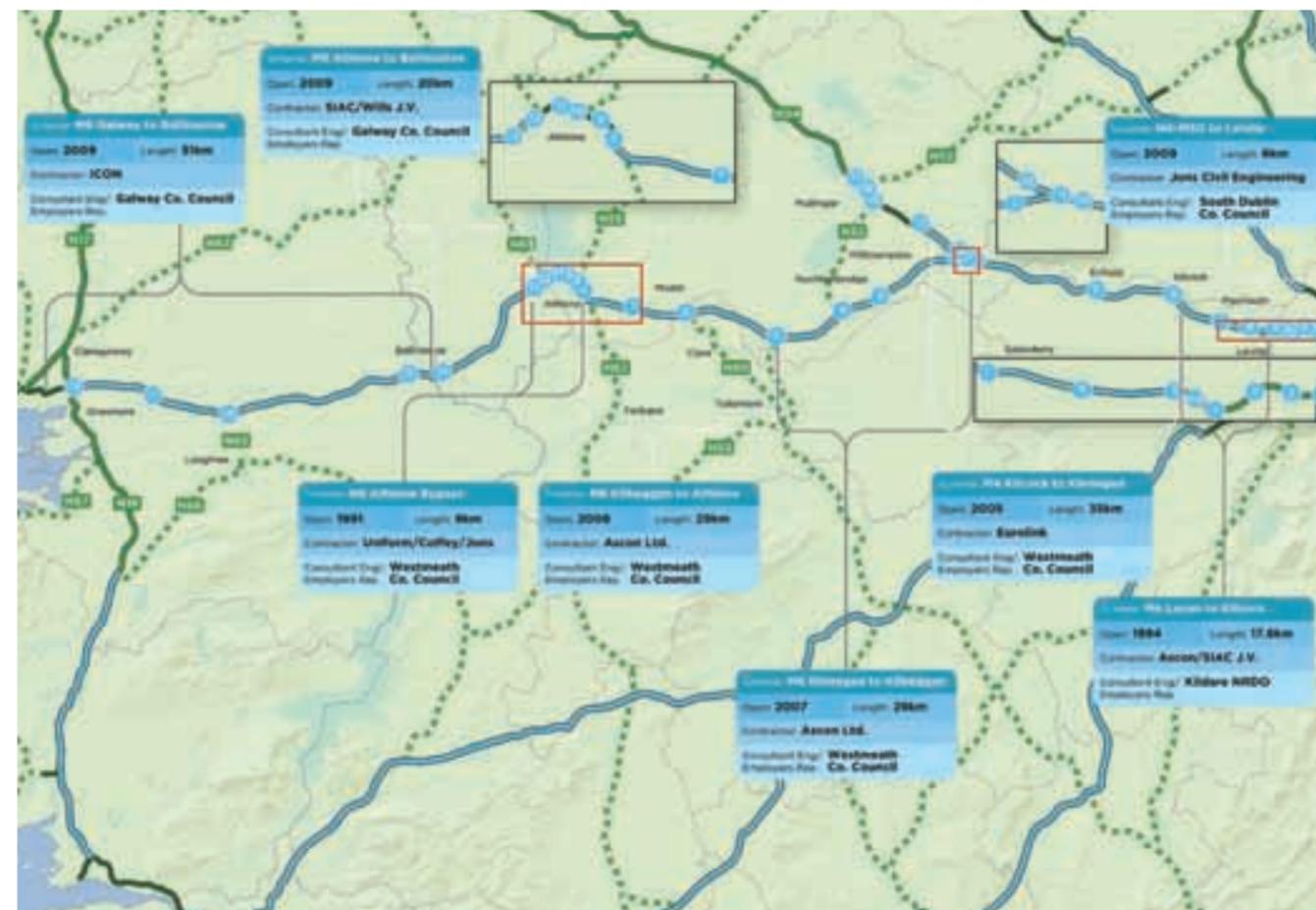
M4/M6 Developments

Ballinasloe East to Galway

The Ballinasloe East to Galway section is the largest road construction project undertaken in the west of Ireland. Rock blasting was required along the route and, in total, 718 blasts were carried out. This resulted in 2.8 million cubic metres of rock being excavated, which was then used for road construction. This meant that local quarries were not exhausted and the transportation of large volumes of rock along local roads, which otherwise would have been necessary to construct the road, was substantially reduced.

An extensive programme of archaeological investigations was conducted, ahead of construction, with recorded excavations at 37 sites. Of these, one of the most significant was the discovery of a Bronze Age hillfort at Rahally, c. 1000 BC. It consists of a series of concentric ditched enclosures, about 430 metres in overall diameter. The hillfort was a place where people from the surrounding area congregated for fairs, religious festivals and kingly inaugurations. This reflects a strong degree of social organisation and control.

Later, the hill on which the hillfort was constructed became a focus for repeated episodes of occupation, preserved today in the form of ringforts and early field systems. The results of these archaeological investigations will have a significant impact on Ireland's appreciation of past human activities in the north Galway region.



Flooding in Galway, 2009

When the rains of November 2009 hit Galway, all of the national primary routes into the county experienced severe flooding, resulting in road closures and serious disruption to transport services. The N18 at Gort, N17 at Claregalway and the N6 at Craughwell were all closed. Hundreds of homes were flooded and the Army was called in to assist the people of Galway. It was vital that access to flooded areas was made possible, while also alleviating the traffic problems that had arisen.

To that end, the Authority and the PPP company building the new M6 Galway to Ballinasloe motorway made special efforts to open sections of the uncompleted road. All available resources were employed to overcome obstacles such as incomplete bridges and junctions, gaps in the road surfacing and other construction issues.

Within 48 hours a 26 km section of the motorway, bypassing the badly affected Craughwell and Loughrea areas, was opened. A 5 km section of the motorway, bypassing Ballinasloe, was also opened. This stretch of road (one lane in each direction) remained open for approximately three weeks, and closed only when the original roads were again passable, to allow motorway construction to be completed.

The exceptional flooding experienced in 2009, underscored the fact that infrastructure, such as roads and bridges, will be subjected to extreme weather conditions over their service life. The Authority's design standards continue to evolve to reflect changing long-term weather patterns and the Authority works closely with other European road authorities in assessing the long-term impacts of climate change and the appropriate design responses.

*M6, Athlone Bypass.***A. KILCOCK TO KINNEGAD**

The 39 km stretch of road between Kilcock and Kinnegad was the first Public Private Partnership (PPP) section to be completed. The new road bypassed Enfield, Clonard, Moyvalley and Kinnegad. This section of motorway includes three grade separated interchanges at Kilcock, Enfield and Kinnegad. There is also a Toll Plaza located between Cappagh Hill and Kilcock, with nine lanes on each side.

Construction

The construction contract was awarded in March 2003, and the road was completed in December 2005.

Environment & Archaeology

Numerous environmental measures were implemented during and post-construction, including the erection of 72 km of badger fencing, bat boxes and the translocation of lamprey and crayfish.

A total of 31 archaeological sites were uncovered, revealing important insights into human activity in the area over the last 7,000 years. An Early Medieval enclosure, dated between the 8th and 10th centuries AD, was discovered at Killickaweeny, in county Kildare. This heart shaped enclosure was populated by a small and self-sufficient community of farmers, weavers and metal workers, as evidenced by a smelting furnace and a range of artefacts including iron ring pins, iron knives and glass beads.

B. KINNEGAD TO KILBEGGAN

The 28 km motorway between Kinnegad and Kilbeggan bypasses Miltownpass, Rochfordbridge and Tyrrellspass. The motorway has three grade separated interchanges (Rochfordbridge, Tyrrellspass and Kilbeggan) and removed over 10,000 vehicles daily from these towns.

Construction

Construction began in April 2005, and was completed in May 2007.

Environment & Archaeology

Archaeologists working on site uncovered 77 previously unidentified sites. There were three large-scale excavations, which included two ecclesiastical enclosures at Clonfad and Ballykilmore and a prehistoric complex at Mearsparkfarm.

An early monastic site, founded by St. Finian of Clonard in the sixth century AD, was located adjacent to a church and graveyard. Another ecclesiastical enclosure was discovered at Ballykilmore, south of Tyrrellspass. It consisted of a large enclosure ditch, which enclosed a graveyard and the stone foundations of a church. Over 1,200 burials have been recorded and are believed to have occurred over several hundred years.



*M6 Galway to Ballinasloe.***C. KILBEGGAN TO ATHLONE**

The 29 km motorway between Kilbeggan and Athlone bypasses Kilbeggan, Horseleap and Moate. Moate was a well known bottleneck, with traffic tailbacks of up to three miles and delays of 45 minutes. The introduction of the motorway removed this, taking 10,000 vehicles a day out of the bypassed communities.

Construction

Construction began in August 2006, and was completed in July 2008.

Environment & Archaeology

A range of environmental measures was implemented to protect water courses, mammals, birds and flora and fauna.

In January 2006, an excavation was undertaken on a gently sloping hilltop in the townland of Creggan Lower, county Westmeath. This represented a habitation area, consisting of a subrectangular, post-built house and a series of pits in close proximity. Pottery and stone tool analysis and radiocarbon dating indicated a Bronze Age date, between 1200 BC and 800 BC.

Recovered artefacts included 77 fragments of Bronze Age pottery. This area of Westmeath has produced many high-status Middle to Late Bronze Age metal artefacts (e.g. gold torcs) and although it was not a high-status site, it was certainly part of broader Bronze Age society, albeit as a centre of production and perhaps trade. It is worth noting that Creggan Lower is located just 4 km south of Lough Ree and a similar distance east of the River Shannon, placing it within a 30 minute walk of the greatest routeway in prehistoric Ireland.

D. ATHLONE TO BALLINASLOE

The 19 km motorway between Athlone and Ballinasloe passes through county Roscommon, removing 12,300 vehicles daily from the old N6.

Construction

Construction began in September 2007, and was completed in July 2009.

Environment & Archaeology

Ecological requirements were strictly adhered to throughout the design and construction of this project. These included water surveys and monitoring, and flora, fauna and habitat surveys. As an example, several areas were fenced and trimmed in order to protect the Small White Orchid.

In March 2007, the remains of a very well-preserved Early Medieval horizontal wooden mill were identified in Kilbegly townland. It is 1,200 to 1,300 years old and among the best preserved examples in Europe.

It has helped to redefine what is known about early milling as well as carpentry techniques in Ireland. Some 250 metres to the west, a cereal-drying kiln and several other cut features were identified. These, and the mill, may well have been part of a milling 'complex' associated with a nearby church.

**E. BALLINASLOE EAST TO GALWAY**

The route runs roughly east-west between Ballinasloe and Galway, rather than dipping south, as the former N6 did, to Loughrea. As a consequence, the new road is 10 km shorter than its principal alternative. The town of Athenry is also now located close to a national primary route for the first time.

The Ballinasloe East to Galway motorway was provided under a PPP contract, which was signed in April 2007. The road was delivered four months ahead of schedule. It is 56 km long, bypasses Ballinasloe, Kilreekill and Craughwell and includes 50 bridges and five grade separated interchanges at Glennascaul, Athenry, Carrowkeel, West Ballinasloe and Tulrush. An additional 32 km of side and link roads were also constructed, as was a 7 km link road from the M6 motorway to the Loughrea Bypass. The Toll Plaza is located at Cappataggle, with six lanes on each side.

Construction

Construction began in April 2007, and was completed in December 2009.

Environment & Archaeology

Specific environmental steps undertaken included noise reduction measures to negate impacts on the River Suck Special Protection Area, which is used in winter by Greenland White Fronted Geese. The M6 scheme also crosses a number of watercourses, which are important salmonid and coarse fisheries, and strict control measures were put in place to ensure their protection.

A total of 36 archaeological sites were investigated, ranging from an early prehistoric hunter-gatherer campsite at Ballynaclogh, in the Suck valley, c. 5000 BC, to a pre-famine estate cottage, c. 1800.

The M6 is not the first major transport project in county Galway: along the new road, older transport infrastructure of 19th century vintage was encountered; and the old Loughrea–Attymon railway bed provided a route for the link road between the M6 and the town of Loughrea. Further east, at Pollboy, the new road crosses the Connaught extension of the Grand Canal, built in the 1820s for canal barges travelling between the Shannon and Ballinasloe.

M7 (Dublin to Limerick) - Distance 199 kilometres

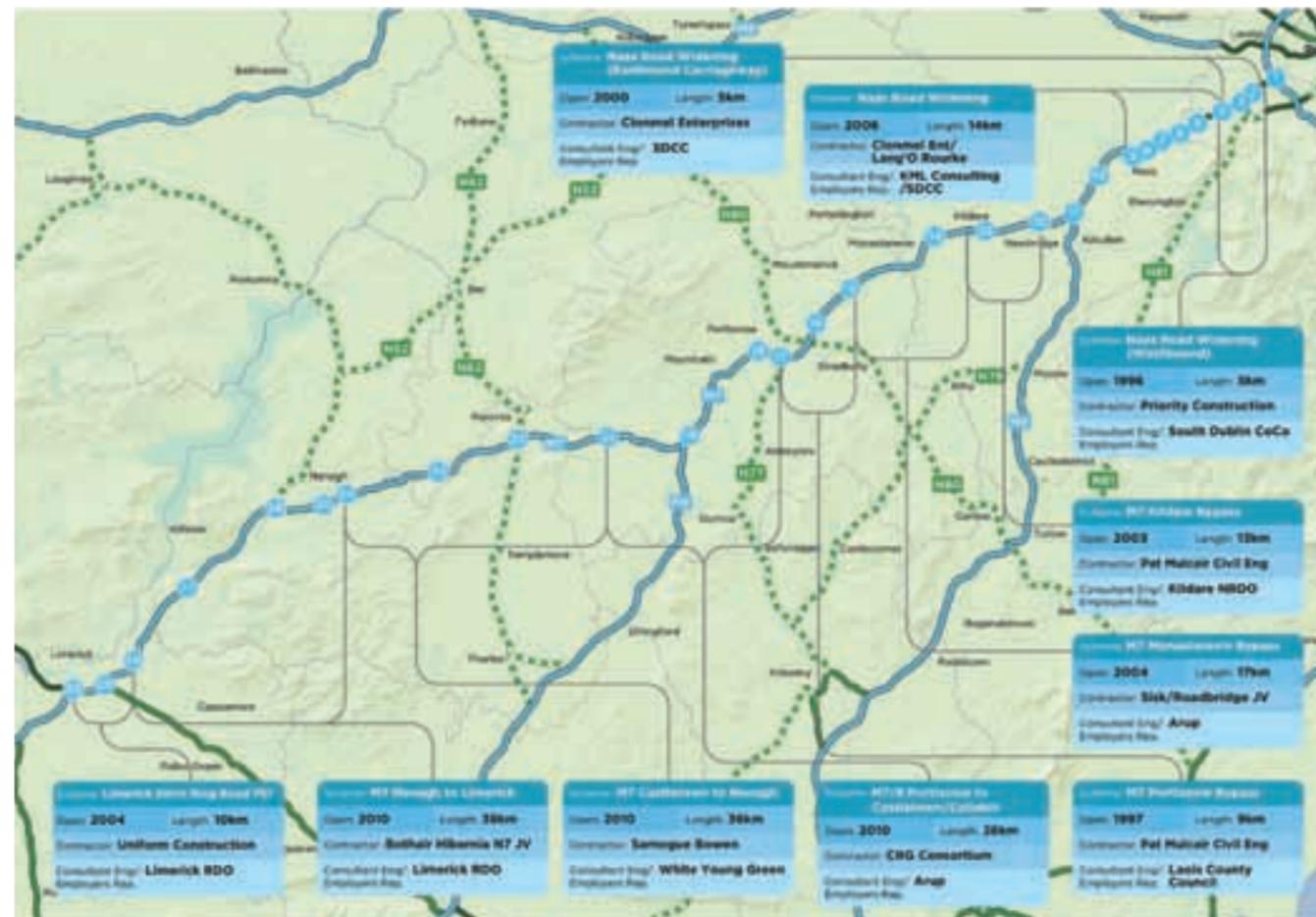
The 36 km stretch of road between Castletown and Nenagh was the final stage of the 199 km M7 motorway between Dublin and Limerick. When it opened in December 2010, it was also the last inter-urban route to be completed.

Before the M7 was built, the journey time from Dublin to Limerick City could take up to three and a half hours. After completion, this was reduced by 40% to two hours and 10 minutes.

The M7 motorway passes through the six counties of Dublin, Kildare, Laois, Tipperary, Offaly and Limerick. It bypasses 12 towns and villages, and was built as 12 distinct road projects. Three of these date back to the 1980s and 1990s: the Naas Bypass (1983), Newbridge Bypass (1993) and the Portlaoise Bypass (1997), while the Dublin to Naas dual carriageway was completed in 1968.

Three bypasses along the route were completed in the early 2000s:

- The Nenagh Bypass (11 km) was initially constructed in 2001 as a wide single carriageway road, to remove 10,000 vehicles a day from the old route. It was subsequently widened to dual carriageway motorway standard as part of the development of the overall Dublin to Limerick route, in line with the NDP's objectives.
- The Kildare Bypass (13 km) removed 20,000 vehicles a day from Kildare Town, when it opened in 2002, while also protecting the important habitat at Pollardstown Fen, which is sustained by the Mid-Kildare Aquifer (see page 10);
- The Monasterevin Bypass (17 km) opened 11 months ahead of schedule in 2004, and links the Kildare and Portlaoise Bypasses, thus saving 30 minutes on peak time journeys.



The 14 km Naas Road Widening and Interchange Scheme was completed between 2004 and 2006. It was widened from a two-lane dual to a three-lane dual carriageway and four grade separated junctions were constructed at Johnstown, Kill, Castlewarden and Steelstown.

At the other end of the route, the Limerick Southern Ring Road (Phase 1) was completed in 2004. This 9.5 km dual carriageway bypasses Limerick City to the south and included the construction of 11 new bridges. (Phase 2 of the Ring Road included the Limerick Tunnel completed in July 2010: see page 68.)

Three further schemes completed the route:

- Portlaoise to Castletown (M7) and Cullahill (M8)
- Castletown to Nenagh
- Nenagh to Limerick

M7 Monasterevin Bypass and River Barrow bridge.

*M7 Portlaoise to Castletown.***A. PORTLAOISE TO CASTLETOWN (M7) AND CULLAHILL (M8)**

The 41 km stretch of road is divided between the M7 and the M8.

The M7 section is 27 km in length. It starts to the west of the Portlaoise Bypass and heads west for 17 km, across the environmentally sensitive River Nore to the interchange at Aghaboe. Here it divides, continuing west for 10 km to Castletown, while the M8 leads south for 14 km, to the south of Cullahill.

This was a PPP funded road, delivered four months ahead of schedule. When the section was finished it completed the entire M8 to Cork, bypassing Abbeyleix, Durrow and Cullahill (M8), as well as Mountrath, Castletown (M7).

The Toll Plaza is at Fatharnagh, and the motorway includes grade separated interchanges at the M7/M8 interchange, Rathdowney and Portlaoise West.

Construction

Construction began in June 2007, and was completed in May 2010.

Environment & Archaeology

As part of the efforts to protect the River Nore Pearl Mussel, which is sensitive to sediment, a captive breeding programme was developed. The Pearl Mussel had stopped breeding at many locations in the River as a consequence of the prevailing water quality conditions, and road construction could have presented additional risks. The captive breeding programme ensured that breeding recommenced and that the mussel was restored to the Nore when road construction work was completed. Other environmental measures were also taken, including the installation of otter ledges beneath the motorway.

A total of 88 archaeological sites (from Neolithic to Modern periods) were discovered and investigated, of which 40 dated to the Bronze Age. The most significant finds were three large enclosures with cemeteries from the Early Medieval period, including one at Parknahown near Cullahill. This was a multi-period site and contained bronze ring pins, a decorated bone comb and a 7th century penannular bronze brooch of Northumbrian origin, with a zoomorphic design of bird heads.

B. CASTLETOWN TO NENAGH

The 36 km stretch of road between Castletown and Nenagh was the last section of the inter-urban routes to be finished. This section of motorway bypasses Roscrea, Moneygall and Toomevara, with four grade separated interchanges, at Nenagh, Moneygall, Roscrea, and Borris-in-Ossory. 90% of traffic using the former N7, approximately 13,500 vehicles per day, moved to the motorway once it was opened.

Construction

Construction began in February 2008, and was completed in December 2010.

Environment & Archaeology

Numerous environmental measures were taken, including the provision of 25 mammal underpasses, badger fencing and the reconstruction of watercourse habitats.

60 archaeological sites were excavated in advance of road construction. These included three large, Bronze Age enclosed settlements at the M7-N62 interchange at Camlin, as well as the discovery of a beautiful bronze axe. The expansive archaeological site also revealed an Early Medieval ringfort strengthened by a large ditch, which probably dated to the time of the Battle of Roscrea against the Limerick Vikings, in 942 AD.





M7, Nenagh to Limerick.

C. NENAGH TO LIMERICK

The 38 km stretch of road between Nenagh and Limerick starts at the northern end of the Nenagh Bypass and extends to Annacotty on the outskirts of Limerick City, where it joins the Limerick Southern Ring Road. The motorway has four grade separated interchanges providing access to Nenagh, Birdhill and Limerick. It removed 90% of the 20,000 vehicles travelling on the old N7 every day between Limerick and Nenagh. It bypasses Birdhill, Daly's Cross and Lisnagry.

Construction

Construction began in January 2007, and was completed in September 2010.

Environment & Archaeology

Numerous environmental mitigation measures were taken, including the planting of 50,000 trees and the bogland planting of devil's bit scabious, which provides the ideal habitat for the rare marsh fritillary butterfly.

The route along the Kilmastulla River valley, and the region southeast of Lough Derg and the River Shannon, served as a major routeway for people and trade throughout history. Numerous discoveries were made which have greatly enriched the knowledge of the area. Giant Irish Deer remains were found at Ballycahill and dated to over 10,000 BC. Several Mesolithic sites, dating to c. 6000 BC, were discovered and an enclosed settlement site at Tullahedy, dating to c. 3600 BC, proved to be one of the most important Neolithic discoveries in Ireland.

M7 Developments

Iron Age Causeway

The most substantial archaeological site found in the Annaholty Bog was discovered during archaeological monitoring of construction work on the M7, between Nenagh and Limerick. Despite having been damaged by bog roads and drains, the large timber trackway, or tógher, was remarkably well preserved and dates to the Iron Age. Tree-ring analysis has established that the large oak planks used in the trackway construction were felled around 40 BC.

The trackway ran between two gravel islands within the bog and while neither end survived, the track's length can be estimated at 65-70 metres long. At 7 metres wide, this was a particularly large example of a timber trackway - wide enough for two carts to pass each other with room to spare. The method of construction was the same as that of a renowned Iron Age example at Corlea, county Longford: two lines of oak and birch roundwood runners were laid along the length of the track and large oak planks were laid side-by-side on top, held in place by pegs.

A total of 1,112 pieces of wood were identified. Such a substantial structure would have required considerable work. It is likely that the excavated trackway was part of a large network of such structures (a road network, even) that used the natural gravel islands as 'stepping stones' across the bog, suggesting that what is now regarded as a desolate area of poor quality land was once a bustling highway.

M8 (Portlaoise to Cork) - Distance 150 kilometres

Dublin to Cork traffic uses the M7 motorway between Dublin and Portlaoise, before veering south-west as the M8. Its total length is 150 kilometres.

The journey on the M8/M7 today, from Cork to Dublin's M50, takes approximately two and a half hours. Prior to the motorway's construction, the journey could take over three and a half hours, with bottlenecks a common problem at Fermoy, Mitchelstown and Cashel.

The motorway passes through the four counties of Laois, Kilkenny, Tipperary and Cork, and bypasses 12 towns. It was built in seven sections, two of which were bypasses (Cashel and Watergrasshill) completed in 2003. The Portlaoise to Cullahill section of the M8, completed in May 2010, was constructed in conjunction with the M7 Portlaoise to Castletown scheme (see page 46).

The four remaining stages were:

- A. Cullahill to Cashel
- B. Cashel to Mitchelstown
- C. Mitchelstown to Fermoy
- D. Fermoy to Rathcormac (Watergrasshill)

M8 Developments

Blackwater Bridge Casting Yard

The crossing of the Blackwater and the Blackwater Valley is an impressive 450 metre viaduct. It crosses the river to the east of Fermoy town and consists of a twin bridge deck, post-tensioned concrete structure supported on seven sets of bridge piers.

The construction was technically complex and it was built by an Austrian construction company (Strabag), which specialises in this particular form of bridge. The viaduct deck was cast on site, in short segments, and launched incrementally, meaning that each segment was pushed almost out of the mould, allowing the next segment to be cast onto it. This provided a continuous deck.

This operation was repeated until the first segment cast reached the opposite side of the river. Pre-stress strands were then threaded through the whole length of the bridge deck and formed into tendons. The tendons were then tensioned to ensure the deck could carry the traffic load and its own weight. The temporary piers were then removed.



M8, Blackwater Bridge.



A. CULLAHILL TO CASHEL

The 39.5 km stretch of road between Cullahill and Cashel was delivered seven months ahead of schedule, removing almost 16,000 vehicles a day from the bypassed towns and villages of Johnstown, Urlingford, Littleton and Horse & Jockey. The motorway includes four grade separated interchanges at Cashel, Horse & Jockey, Twomileborris and Urlingford.

Construction

Construction began in November 2006, and was completed in December 2008.

Environment & Archaeology

Environmental mitigation measures were taken along the route, while 46 previously unknown archaeological sites were discovered and excavated. These included a Bronze Age wooden trackway found at Longfordpass North.

The modern village of Twomileborris is built on the site of an Anglo-Norman borough. Excavations to the south of the village uncovered extensive prehistoric and Early Medieval remains, while a pit contained 61 silver coins of probable 14th century origin.

B. CASHEL TO MITCHELSTOWN

The 41 km stretch of road from Cashel to Mitchelstown runs through the heart of South Tipperary and into county Limerick, bypassing New Inn, Skehennarinky and Kilbehenny villages. It incorporates a bypass of Cahir town on the N24.

Construction

Construction began in March 2006, and was completed in July 2008.

Environment & Archaeology

Numerous, standard environmental mitigation measures were taken along the route, while around 90 new archaeological sites were identified during geophysical and aerial surveys of the route. These were all investigated. Excavated sites date from the late Neolithic through to the later Bronze Age periods, providing evidence that settlements were established on both sides of the River Suir. Also discovered were three well-presented Late Iron Age/Early Medieval ring-barrows, one Early Medieval settlement site, and one post-medieval weaver's cottage.

Archaeology Find

Bronze Age roundhouses were excavated close to Mitchelstown, where a cup in the shape of a face and a pot with 'ears' were discovered in a pit. The pit was lined with two flat stones and also contained an urn and ceramic spoon. The four items are 3,800 years old and date to the early Bronze Age. Pottery vessels with human form are known from Bronze Age cultures in south-east Europe, but pottery like this has never before been found in Ireland (see Inside Back Cover).



M8, Fermoy Bypass.



C. MITCHELSTOWN TO FERMOY

The 16 km stretch of road between Mitchelstown and Fermoy links the Fermoy Bypass to Carrigane, 5 km north of Mitchelstown. There are three grade separated interchanges at Carrigane, Ballybeg and Moorepark, with the motorway bypassing Kilworth Camp and Mitchelstown. Once opened, the new stretch of motorway carried 16,000 vehicles a day.

Construction

Construction began in December 2007, and the road was opened in May 2009.

Environment & Archaeology

Environmental mitigation measures along the route include the provision of bat boxes, mammal passes and fencing, as well as noise barriers. Attenuation ponds were installed to mitigate the impact of road drainage on receiving watercourses.

1,800 artefacts, at 30 archaeological sites, revealed human activity stretching back over 9,000 years. On the southern bank of the River Funshion, there was evidence of flint blade manufacturing from Early Mesolithic times (8000 to 7000 BC). A rare 'Beaker' settlement (2400 to 2000 BC), discovered at Ballinacarriga, is unique in county Cork. The Beaker period spans the transition between the Neolithic and the Bronze Age (c. 2600 BC to 1600 BC), when metal-working was first introduced.

D. FERMOY TO RATHCORMAC

The 18 km of motorway between Fermoy and Rathcormac stretch from the Moorepark interchange north of Fermoy, to the Watergrasshill Bypass south of Rathcormac. The motorway bypasses Rathcormac village and Fermoy. It was delivered eight months ahead of schedule through a PPP scheme.

Construction

Construction began in June 2004, and was completed in October 2006. The project included the crossing of the Blackwater River (see page 50).

There are three grade separated interchanges at Rathcormac, Corrin and Moorepark.

A Toll Plaza is located at Skahanagh North, between Rathcormac and Watergrasshill, with two subsidiary toll plazas at the Corrin interchange. There are six lanes in each direction at the mainline plaza.

Environment & Archaeology

Mammals identified in the area included badgers, otters, red squirrels and red deer, and measures were taken to mitigate against adverse impacts on this population.

A total of 44 archaeological sites were investigated. One discovery revealed a multi-phased site at Ballybrown Lower, which comprised three unenclosed Early Bronze Age houses, three Middle Bronze Age enclosures and evidence of Late Bronze Age cremation pits. Also discovered were the skeletal remains of six giant Irish Deer, dated 11,139 – 10,962 BC, from Ballyoran Bog, and a prehistoric hunting platform in the bog itself.

*M9, Knocktopher to Carlow.***B. CARLOW BYPASS**

The 18.5 km Carlow Bypass runs from the Prumplestown interchange, north east of Carlow, to the Powerstown interchange to the south. An additional interchange is located at Rathcrogue on the N80. It removed 9,000 vehicles a day from Carlow's streets.

Construction

Construction began in July 2006, and the road opened in May 2008.

Environment & Archaeology

A variety of environmental mitigation measures were implemented. A total of 64 sites were excavated along the route, dating from the Mesolithic period (7000 BC to 4000 BC). Carlow's earliest known house, dated between 3776 BC and 3636 BC, was discovered at Russelltown. Excavations of sites from the first millennium AD revealed ecclesiastical remains at Busherstown and an extensive rural medieval settlement at Moyle Big.

C. KNOCKTOPHER TO CARLOW

The 40 km stretch of motorway between Knocktopher and Carlow was the largest construction job ever undertaken in Kilkenny, and was completed ahead of schedule. This section of the motorway removed through-traffic from Stoneyford, Dungarvan, Thomastown, Gowran and Paulstown. It incorporates three grade separated junctions and three bridges over the Kings River, the Nore and the Barrow, which presented significant challenges because of their location within a Special Area of Conservation. It also included the construction of 6.5 km of single carriageway link road to Kilkenny City.

Construction

Construction began in February 2008, and the road was opened in September 2010, thereby completing the M9.

Environment & Archaeology

Environmental mitigation measures protected watercourses and aquifers from pollution. Considerable care was taken to minimise the impact on the Danganbeg Wetland, an important ecological habitat.

A total of 110 previously unknown archaeological sites dating from the fifth millennium BC to the 19th century AD were discovered. Finds included two Mesolithic stone tools, or Bann flakes (approximately 4500 BC), at a site beside the River Nore at Kilree.

D. WATERFORD TO KNOCKTOPHER

The 24 km stretch of motorway between Waterford and Knocktopher links to the N25 Waterford Bypass. The route includes two grade separated interchanges and bypasses Mullinavat, Ballyhale and Knocktopher.

Construction

Construction began in January 2007, and was completed in March 2010.

Environment & Archaeology

Badger and otter proof fencing as well as underpasses were installed, while the design and construction of the scheme also considered the particularly sensitive Special Area of Conservation at Hugginstown Fen. The preferred route was designed to avoid all known archaeological monuments, yet 54 new sites were discovered. These dated from 4000 BC to 19th century AD. Kilkenny is well known for its upstanding medieval remains, but evidence of Neolithic farming was also discovered at Rahard West and Earlsrath. A number of stone axe-heads were found, which may have been used by the first farmers to clear woodland. Numerous Bronze Age sites were also discovered, as was a ringfort near Baysrath. A large enclosure complex, measuring 85 metres in diameter, was discovered at Kilree, dating between the 7th and 10th centuries AD.



OTHER MAJOR NATIONAL ROAD SCHEMES

In addition to the inter-urban routes, the National Roads Authority carried out a series of other road projects on both primary and secondary route networks throughout the country.

MAJOR ROAD SCHEMES:

- **Dublin Port Tunnel**
- **M50 Completion & Upgrade**
- **Limerick Tunnel**
- **M/N3 Motorway**
- **N25 Waterford City Bypass**

OTHER NATIONAL PRIMARY SCHEMES:

- **N2 Castleblayney Bypass**
- **N5 Charlestown Bypass**
- **N11 Glen of the Downs, Ashford-Rathnew, Gorey Bypass**
- **N15 Ballyshannon to Bundoran Bypass**
- **N18 Newmarket-on-Fergus**
- **N18 Ennis Bypass**
- **N25 Kilmacthomas**
- **N25/N27 Kinsale Road Interchange**

NATIONAL SECONDARY ROAD SCHEMES

- **N51 Navan Inner Relief Road**
- **N52 Schemes**
- **N71 Skibbereen Relief Road**
- **N77 Kilkenny Ring Road**

SCHEMES OPENED 2000 – 2003

- N72 Killarney Northern Relief Road Stage 2 (2000).
- N9 Moore Timolin (2000).
- N51 Navan IRR (2000).
- N7 Nenagh Bypass (2000).
- N20 Adare-Limerick (2001).
- N33 Ardee Link Road (2001).
- N21 Ballycarthy-Killally (2001).
- N24 Beray's Cross-Grange Cross (2001).
- N20 Blackpool Bypass (2001).
- N15 Clar-Barnsmore Gap (2001).
- N20 Croom Bypass (2001).
- N52 Dunleer-Dundalk (2001).
- N4 Joanstown to County Boundary (2001).
- N25 Link to Kilmacthomas Bypass (2001).
- N53 Link to Nenagh Bypass (2001).
- N56 Mountcharles Bypass (2001).
- N4 The Downs (2001).
- N33 Bealagrellagh-Gortalea (2002).
- N15 Bundiff-Dowes River (2002).
- N25 Camaross (2002).
- N4 Enfield Relief Road (2002).
- N9 Grannagh-Waterford (2002).
- N17 Knock-Claremorris Bypass (2002).
- N18 Newmarket-on-Fergus Bypass (2002).
- N24 Pilltown-Fiddown Bypass (2002).
- N11 Glen of the Downs (2003).
- N18 Hurlers Cross (2003).
- N19 Shannon Access Route (2003).
- N71 Skibbereen Bypass (2003).
- N25 Youghal Bypass (2003).

SCHEMES OPENED 2004 – 2007

- N11 Ashford-Rathnew Bypass (2004).
- N26 Ballina-Bohola – Phase 1 (2004).
- N22 Ballincollig Bypass (2004).
- N04 Hughestown-Meara (2004).
- N7 Parkway (2004).
- N5 Scramogue (2004).
- N21 Ballcarthy-Tralee (2005).
- N2 Carrickmacross Bypass (2005).
- N22 Gortalea-Farranfore (2005).
- N6 Loughrea Bypass (2005).
- N4 McMeads Bridge-Kinnegad (2005).
- N20 Rathduff-Mallow (2005).
- N4 Sligo Inner Relief Road (2005).
- N2 Ashbourne Bypass (2006).
- N15 Bundoran-Ballyshannon (2006).
- N21 Castleisland-Abbeyfeale (2006).
- N55 Cavan Bypass Link (2006).
- N4 Edgeworthstown Relief Road (2006).
- N30 Enniscorthy-Clonroche (2006).
- N25 Kinsalebeg (2006).
- N56 Letterkenny Ring Road (2006).
- N8 Mitchelstown Relief Road (2006).
- N2 Monaghan Bypass (2006).
- N52 Mullingar Bypass Phase 1 (2006).
- N11 Arklow-Gorey Bypass (2007).
- N02 Castleblayney Bypass (2007).
- N5 Charlestown Bypass (2007).
- N4 Dromod-Roosky (2007).
- N18 Ennis Bypass (2007).
- N77 Kilkenny Ring Road Extension (2007).
- N52 Kinnegad-Athlone Phase 1b (2007).
- N56 Mountain top-Illustrim (2007).
- N52 Mullingar Bypass Belvedere (2007).

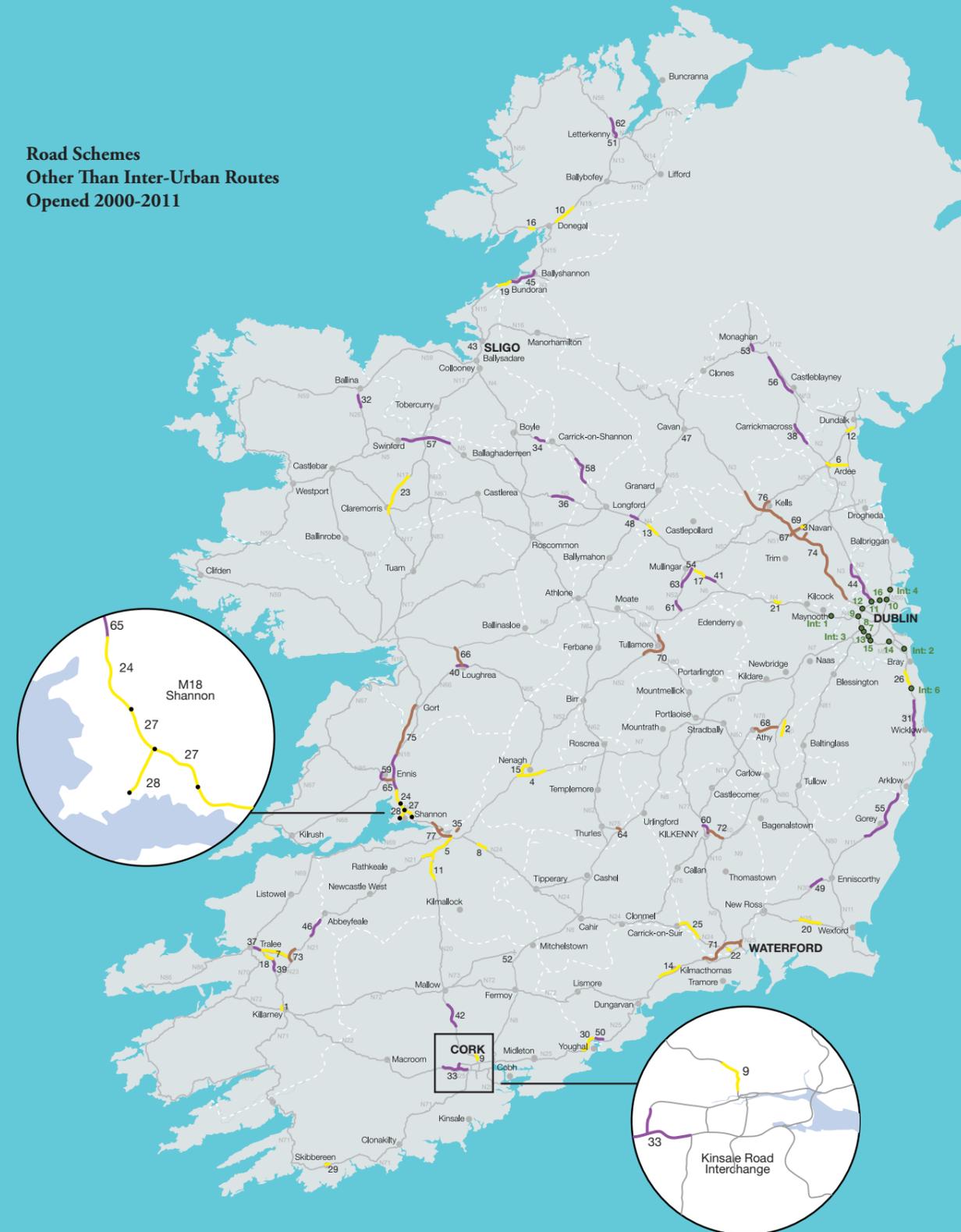
SCHEMES OPENED 2008 – 2011

- N75 Cullahill-Cashel (2008).
- N85 Ennis Bypass (2008).
- N65 Ballinasloe-Galway (PPP) 2009.
- N51 Clonee-Kells (PPP) (2009).
- N78 Kilcullen-Carlow (2009).
- N51 Navan IRR Phase 1b (2009).
- N52 Tullamore Bypass (2009).
- N25 Waterford City Bypass (2005).
- N10 Carlow-Knocktopher (2010).
- N21 Castleisland Bypass (2010).
- N03 Clonee-Kells (PPP) (2010).
- N18 Gort-Crusheen (2010).
- N52 Kells (2010).
- N18 Limerick SRR (Phase II) (PPP) (2010).

INTERCHANGES OPENED 2000- 2011

- INT 1: N4 Celbridge Interchange (2003).
- INT 2: N11 Wyatville (2004).
- INT 3: M7 Kingswood Interchange (2005).
- INT 4: M7 Drynam Interchange (2005).
- INT 5: N25 Kinsale Road Interchange (2006).
- INT 6: N11 Kilpedder Interchange (2008).
- INT 7: M50 Ballymount Roundabout (2008).
- INT 8: M50 Red Cow Interchange N7/M50 (2008).
- INT 9: M50 Liffey Valley Interchange N4/M50(2008).
- INT 10: M50/N01 Interchange Freeflow (2010).
- INT 11: M50/N02 Interchange Freeflow (2010).
- INT 12: M50/N03 Interchange Freeflow (2010).
- INT 13: M50 Upgrade of N81 (2010).
- INT 14: M50 Upgrade of Sandyford (2010).
- INT 15: M50 Scholarstown (2010).
- INT 16: M50 Upgrade of Ballymun (2010).

Road Schemes Other Than Inter-Urban Routes Opened 2000-2011



Dublin Port Tunnel

During the 1980s, a strategic report was produced by the Department of the Environment & Local Government to show how Dublin Port could be better connected to the rest of the country. Trucks travelling through Dublin City, en route to and from the port, were causing major problems including safety issues, air pollution and serious traffic congestion.

Numerous solutions were considered, including a tunnel running to the west of the city, a rail-only connection and variations of these. The option finally chosen was a tunnel running in a northerly direction, from Dublin Port out to Whitehall. The decision was made on economic, environmental and traffic grounds. It was later decided, for air quality reasons, to extend the planned tunnel approximately 2 km to the Coolock Lane Interchange in Santry, where it merged with the M1 motorway corridor, just south of the M50.

The Planning Process

The planning process was a long and complicated one. Due to its large scale, its route and the logistical requirements, it proved to be a contentious project. There were major concerns about the disruption it would cause, especially the structural stability of homes along the route, as well as the construction cost.

Other concerns had been raised during pre-planning and throughout the extensive public consultation process, including environmental impact issues and construction methods. There were also concerns about the intention to construct a twin bore instead of a single bore tunnel, a decision which was guided by safety considerations.

The planning process took many years to complete but the Dublin Port Tunnel began construction in June 2001.

Building the Tunnel

The tunnel is dual carriageway northbound and southbound, and 4.5 kilometres in length (the scheme in its entirety is 5.6 km). This is made up of 2.1 km of twin cut & cover tunnels and 2.4 km of twin-bored tunnels. Where the tunnel was twin-bored the depth of the tunnel beneath ground level was in excess of 20 metres. The height clearance is 4.65 metres. The tunnel exits at Dublin Port and crosses over a new bridge above the Tolka River.

It was, at the time, the largest urban tunnel constructed in Europe. It required a close working relationship between the contractor, the Authority and Dublin City Council. Not surprisingly with an underground project of this size, difficulties were encountered. In places, ground terrain was not what had been expected, while additional challenges were presented by tunnelling under the Iarnród Éireann line. There are seven railway tracks on the Connolly to Belfast route and these all remained live during construction. Residents' noise concerns also led to delays as boring was significantly restricted to specific hours in some areas.

The tunnel opened to trucks in December 2006, and to all traffic the following month. In the first six months of operation one million Heavy Goods Vehicles (HGVs) passed through the tunnel. Over 98% of HGVs leaving Dublin Port can use the Port Tunnel, with a journey time of just six to eight minutes to reach the M1 and M50.

Today, approximately 6,000 HGVs use the tunnel daily and they do so toll-free. All other vehicles, apart from coaches with over 25 seats and specially adapted cars for disabled drivers, pay a toll.



Dublin Port Tunnel Drilling Crew.

Facts & Figures

- 2 million tonnes of rock and clay were excavated.
- The twin tubes are linked every 250 metres by pedestrian cross passages, and every 1,000 metres by vehicle cross passages, providing emergency exits.
- 40,000 trees and shrubs were planted as part of landscaping.
- 5,000 people were employed during construction.
- Gráinne, the hard rock tunnel boring machine, weighed 1800 tonnes, was 156 metres long, used 3.2 MW of electricity and cost approximately €27 million. It required 45 tunnellers per shift.
- Megan, the boulder clay boring machine, weighed 1100 tonnes was 60 metres long, used 400 kw of electricity and cost €10 million. It required 18 tunnellers per shift.

The project was joint winner (with the New York World Trade Centre Recovery Effort) of the 2003 International Fleming Award for novel geotechnical construction solutions.

The benefits of the tunnel are not limited to the traffic and businesses that use it every day, nor to Dublin Port. In February 2007, Dublin City Council introduced a HGV Management Strategy banning HGVs from entering Dublin City streets between 7am and 7pm. The designated cordon around the city centre stretches from the Royal Canal to the Grand Canal. To access or exit the port (and the national road network), HGVs must do so via the Dublin Port Tunnel. For HGVs delivering goods to businesses in the city centre they must first obtain a permit from Dublin City Council.

This has improved air quality and traffic movement in the city centre, reduced the number of accidents, made it safer for pedestrians and cyclists, and opened up bus corridors along the river, allowing CIE to deliver more accurately on its schedules.

M50 Completion and Upgrade

Construction of the M50, Dublin's orbital route, began in 1987 on the Western Parkway, seven years before the establishment of the National Roads Authority.

As the M50 was going through the planning stages in the early 1980s, Ireland's economy was stagnant and unemployment levels were running just below 20 per cent. Times were difficult and the approved plan for the M50 was formulated against this background and with modest assumptions of future economic growth and traffic demand. There was little expectation then of the economic boom that was to follow over the next two decades, which led to an economic upsurge and a rapid growth in business activity and vehicle ownership.

M50 Completion

Sections of the M50 which had already been built by 2000 included the Western Parkway, between Junctions 6 (N3) and 11 (N81), which was completed in 1990; the Northern Cross section, between Junctions 3 (N1) and 6 (N3), which was completed in 1996; and a tolled bridge over the River Liffey between Junctions 6 (N3) and 7 (N4).

A second bridge over the River Liffey, alongside the existing bridge, was built in 2003 to cater for increasing traffic volumes.

The M50 C-Ring was completed with the construction of the Southern Cross Route (Junction 11 to 13) and the South Eastern Motorway (Junction 13 to 17).

Southern Cross Route (SCR)

The Southern Cross Route stretches for 9 km from Junction 11 (the N81 Tallaght Road) to Junction 13 (Ballinteer). It opened in August 2001. The new road removed 5,000 cars per hour from the local road network, resulting in an immediate improvement to local traffic flows and better access to the M50 radial routes. Junction 12 is the Firhouse interchange.

Prior to and during the construction of the SCR, the Authority and local county councils designed solutions to enhance the capacity of the local road network. Several improvement schemes were introduced, including the Spawell Link between the N81 and the Firhouse Road, the Green Route from a new Scholarstown Road roundabout to the Ballinteer interchange, and the Ballinteer-Wyckham Bypass.

South Eastern Motorway (SEM)

The completion of the Southern Cross Route paved the way for the final 10 km South Eastern Motorway (SEM) section, which linked the SCR at Ballinteer to the M11 Dublin/Wexford road at Shankill. It included three grade separated interchanges at Sandyford, Carrickmines and Cherrywood.

Construction began in October 2001 and, when completed in June 2005, the M50 motorway was formally opened in its entirety.

There was a considerable volume of archaeological work conducted on the scheme, which lasted almost five years. The key focus of the work was on the Carrickmines Castle site, where up to 130 archaeologists were working at any one time (and up to 200 across the SEM). The medieval Carrickmines Castle site proved controversial with numerous legal delays holding up construction work, resulting in delayed scheme completion. The Authority dealt with the archaeology of the site by a combination of preservation in situ and preservation by record.



M50 Upgrade
under construction.



The M50 Upgrade

By the time the South Eastern Motorway had been completed, in June 2005, some sections of the M50 were already experiencing heavy congestion on a daily basis. The existing road was constrained by the West-Link toll plaza, the signalled junctions, and insufficient mainline capacity.

The Authority and the Dublin local authorities had recognised the pending problems in the early 2000s and an M50 upgrade scheme was already progressing through the planning process.

Construction began in March 2006.

In order to increase capacity on the M50, a number of measures had to be taken:

- Widen the motorway from two to three-lane standard in each direction between Junction 3 (M1) and Junction 14 (Sandyford), the section carrying the highest traffic volumes.
- Introduce an additional fourth auxiliary lane in each direction between Junction 3 (M1) and Junction 12 (Scholarstown) to enhance traffic movements and operational efficiency.
- Ensure full free-flow interchanges at four junctions and partial free-flow interchange at six others.
- Removal of the West-Link Toll Plaza to provide barrier-free tolling, thereby addressing a critical traffic congestion hotspot.
- Establish a segregated corridor for the Luas at Junction 9 (N7, Red Cow roundabout), thus removing the need for traffic and trams to cross each other.

The project's budget was €1 billion and the M50 upgrade was carried out in the midst of almost 100,000 moving vehicles per day. Emergency lanes also had to be kept open at all times. Despite these pressures and constraints, and with the co-operation and patience of the public, the upgrade was completed in four and a half years.

The final section of the upgraded M50 motorway – the new and improved M3 interchange – was opened in September 2010. Today it is a free-flowing motorway of the highest quality, which has reduced journey times by over 50 per cent at peak times. Traffic volumes before the upgrade were estimated at 90,000 vehicles per day and subsequently rose to 110,000 in 2010, along the busiest sections of the motorway (Junction 6 to Junction 9).

Tolling & eFlow

The removal of the West-Link Toll Plaza in August 2008, and its replacement with a fully electronic barrier-free tolling system (eFlow), was a crucial element of the strategy to ease congestion on Ireland's busiest roadway.

The award-winning system introduced has proved highly successful, and caters for an ever-increasing volume of traffic without any delay. Associated with this, the Authority introduced full interoperability between different tag providers and all of the country's road toll points, with systems that have also won international awards and recognition.

*Limerick Tunnel (PPP).***Limerick Tunnel**

Limerick is Ireland's third largest city. It is an important hub in the network of national roads and a designated Gateway in the Government's National Spatial Strategy.

The M7 motorway was a vital link opening up the region and connecting Limerick to Dublin, but it was not the only road infrastructure required: the City also needed to be bypassed. Such a bypass would take approximately 40,000 vehicles per day from the City centre. This would greatly ease traffic congestion, enhance business, lower CO2 emissions, increase safety and improve air quality. It would also improve traffic movements along the Atlantic Road Corridor, particularly the section of the Corridor between Cork and Limerick and onwards to Shannon Airport, Ennis and Galway.

The bypass, completed in June 2010, runs to the south and west of the city from the M7 Rosbrien Interchange to the junction with the N18/M18 Galway road. The project was financed through a combination of private and Exchequer funding. The project included 10 km of dual carriageway, raised 10 metres above the flood plain in places, and 10 bridges. The biggest challenge, however, was crossing the River Shannon.

Crossing the Shannon

There were two obvious solutions: build a bridge over the river, or a tunnel under it. The preference was to ensure continued access to Limerick Port, for sea-going vessels, which meant that the most viable solution was to build a tunnel.

The length of the tunnel is 675 metres, of which 500 metres lie on the Shannon riverbed.

One of the first construction decisions was to determine where the tunnel should actually be constructed. It was decided to build a casting dock on dry land, on the northern bank of the river. The dock was 600 metres long, 30 metres wide and 11 metres deep (below river level). This was dug out of difficult ground conditions which constantly threatened the integrity of the casting dock. This dock enabled the construction of five concrete tunnel sections, each 100 metres in length and weighing 20,000 tonnes.

Preparing the River

While construction of the tunnel sections continued, the River Shannon was being dredged along the intended route. Half a million cubic metres of material were piped out of the river into specially dug lagoons. Covering an area of five hectares, these lagoons quickly began their transformation into wetlands. Dredging was also limited to specific months so that it would not interfere with the annual salmon run up the Shannon. This is one of Ireland's largest salmon runs and affects the livelihoods of many.

First Steps Under the Shannon

When the tunnel construction was finished, a channel was dug from the river to the casting dock which was then breached. Each of the five tunnel sections was towed out and sunk in position so that the sections could merge as one. In December 2008, the five sections were connected fully, allowing the first person to walk under the Shannon; and, in May 2010, after almost 18 months of further work, 20,000 Limerick people did the same in an event to mark the completion of the project.

The project took almost four years to complete, commencing in August 2006 and opening in June 2010.



*M3 Motorway.***M/N3 Dublin - Kells**

The N3 was a busy route connecting Dublin and Meath, and on to the north west.

As the Irish economy grew in the late 1990s, the N3 attracted growing numbers of commuters who moved to the towns and villages along the route, prepared to endure the daily commute in return for more affordable housing and a better quality of life. This led to traffic bottlenecks and safety issues at peak times through Dunshaughlin, Navan and Kells, which presented problems not only for the local communities and the environment, but also for those travelling to and from the north west region.

It was decided in 2000 that the new M/N3 would be funded through a PPP contract.

This scheme included over 100 km of new road, making it the biggest road scheme in the country's history. It included:

- 51 km of motorway from Clonee to north of Kells
- 10 km of type 2 dual carriageway to the N3 at the Meath/Cavan border
- 4 km of 2 lane single carriageway forming the N52 Kells Bypass
- 47 km of side and link roads
- 63 over- and under-bridges, 6 grade separated junctions (Pace, Dunshaughlin, Blundelstown, Kilcarn, Athboy Road (N51) and Kilmainham)
- 3 river crossing bridges and 1 footbridge
- 2 Toll Plazas

Construction

Construction started in April 2007. At the height of activity, over 1,800 people were employed on the project. It was completed almost two months ahead of schedule, in June 2010, and within budget.

This €1 billion project was one of Europe's largest road projects at the time. By bypassing the bottlenecks of Dunshaughlin, Navan and Kells, the road has removed through-traffic, improved environmental standards and promoted a safer and better quality of life for local residents. It enhances economic opportunities and provides a strategic link to and from the nation's capital, cutting an hour or more off peak time journeys between Cavan and Dublin.

Archaeological Issues

The scale of the project presented considerable planning, implementation, design and construction challenges, particularly relating to the archaeological significance of the area around the Hill of Tara. A number of route options were examined carefully before deciding on the best route. None of the alternatives presented a better option: going further to the east would take the road through a village and have environmental implications on sensitive woodlands; going to the west would have had a greater visual impact on, and from, the Hill of Tara. The route selected was actually further away from the Hill of Tara than the old N3.

As with all schemes, appropriate investigations were carried out to identify potential sites of archaeological significance. These uncovered a previously undocumented site at Lismullin, subsequently designated a National Monument. In total, 167 sites from the Mesolithic period to the early modern period were excavated.

**Lismullin National Monument**

In 2007, a site occupying an area of over 27,000 square metres was discovered at Lismullin, 850 metres to the north east of the old N3, and 2.1 km north east of the Hill of Tara. It revealed a large, postbuilt ceremonial enclosure dating to the early Iron Age (6000 to 4000 BC). The site was not limited to the early Iron Age, however, as it also included important features from the Early and Middle Neolithic, the Early Bronze Age, and the Early Medieval periods.

Excavation was carried out under Ministerial Directions issued by the Department of the Environment, Heritage & Local Government, in consultation with the National Museum of Ireland. Lismullin was designated as a National Monument, by the Minister, in June 2007.

*Lismullin National Monument.*

*River Suir Bridge,
Waterford Bypass.*

N25 Waterford City Bypass

A major development complementing the M9 motorway was the construction of the N25 bypass around Waterford City, which began in April 2006. The City, and the Rice Bridge in particular, had been a problem traffic area for many years. The new bypass consists of 23 km of dual carriageway and 14 km of single carriageway, and includes the Western Link, which provides connections to the industrial areas to the south west of the City and links the M9 and N24 to the Grannagh Interchange. It has been described as the most important infrastructural development in Waterford, in living memory.

It was developed as a PPP and opened in October 2009. The Toll Plaza is located on the south side of the River Suir Bridge, and there are five lanes in each direction.

Over 10,000 vehicles a day have been removed from Waterford's quays and journeys have been reduced by up to 20 minutes between Rosslare and Cork, at peak times.

The bypass includes a new Suir River crossing at Grannagh, in the form of a 465 metre cable stay bridge. This is the longest of its type in the country and, by using cables, it meant that there was minimal construction in the fast-flowing River Suir – a designated Special Area of Conservation – thus protecting the river's environment as far as possible.

The most significant archaeological discovery was Woodstown.

Woodstown

The Viking site of Woodstown was discovered in April 2003. It straddles the south bank of the River Suir, and was discovered during test excavations prior to the construction of the Waterford City Bypass.

The limited archaeological excavation that was conducted indicated Early Christian and Later Viking Age occupation of the site. Extensive evidence was found of craft-workings in fine metals (e.g. silver), as well as iron working, stone, glass, bone, antler and amber. Some finds, including copper-alloy stud mounts with gold foil and a copper-alloy book clasp, may have been treasure trove from monastic raids.

The archaeological evidence indicates that during the middle of the 9th century the site was occupied, and presumably taken over, by Viking raiders. Evidence of Viking metalworking in silver and lead was found, and the site has produced the largest assemblage of lead pan weights outside Viking Dublin. Exotic finds of possible Norwegian schist whetstones and a fragment of a silver Kufic coin from Byzantium reflect the wider world in which Vikings operated. Ships nails and rivets reflect their maritime basis. A single Viking warrior grave with full battle armour was also discovered, but due to the acid soil no skeleton survived.

It was abandoned c.1050 AD, for reasons as yet unknown. The site may have been an upriver trading station, six kilometres from the Viking town of Waterford. The settlement has been preserved in situ by Ministerial order issued in 2005, and declared a national monument, which necessitated the realignment of part of the bypass.



OTHER NATIONAL PRIMARY & SECONDARY SCHEMES

The inter-urban routes, the Dublin Port Tunnel, the Limerick Southern Ring Road, Waterford City Bypass, the M/N3 and the completion and upgrade of the M50 were the high profile road infrastructure projects that caught the public's and media's attention. An extensive programme of major improvement works on other national routes, however, was also carried out in this period.

A list of each of the 108 schemes completed during the decade is provided in the Appendix. These include:

National Primary Road Schemes

- N2 Castleblayney Bypass
- N5 Charlestown Bypass
- N11 Glen of the Downs, Ashford-Rathnew Bypass, Gorey Bypass
- N15 Ballyshannon to Bundoran Bypass
- N18 Newmarket-on-Fergus
- N18 Ennis Bypass
- N25 Kilmacthomas
- N25/N27 Kinsale Road Interchange

National Secondary Road Schemes

- N51 Navan Inner Relief Road
- N52 Schemes
- N71 Skibbereen Relief Road
- N77 Kilkenny Ring Road

National Primary Road Schemes

N2 Castleblayney Bypass

Construction on the 16 km bypass began in November 2005. The N2 is a national primary route and serves as the main arterial route from Dublin to Derry, Donegal and the north west.

The new scheme resulted in the realignment of the existing N2, from north of Clontibret to south of Castleblayney town. The scheme was built as a 2+1 section, consisting of two lanes in one direction of travel and one lane in the opposite direction, alternating at intervals of approximately 2 km. This scheme was a pilot Type 3 dual carriageway.

The bypass was completed in November 2007, on time and within budget. Car journeys in the area were cut by up to 25 minutes and traffic congestion in Clontibret and Castleblayney was reduced significantly.

N5 Charlestown Bypass

The Charlestown Bypass forms part of the N5 national primary route between Westport and Longford. The scheme bypasses Charlestown and Carracastle and has removed up to 7,000 vehicles each day from these communities. Construction began on the 18 km of single carriageway in March 2006, and was completed in November 2007.

The Charlestown Bypass is located on the Atlantic Road Corridor, which runs from Donegal through the west, down to Cork and on to Waterford. This was a key route targeted for development under Transport 21 and the NDP 2007-2013.



Interchange, on N11.

N11

Numerous schemes were completed between 2000-2010 along the N11 route between Dublin and Rosslare. Chief among them were the Glen of the Downs upgrade, the Ashford-Rathnew scheme and the Gorey Bypass. (The Arklow Bypass opened in 1999, while the 5 km four lane Newtownmountkennedy section was completed in 1990.)

Glen of the Downs

Construction on the upgrade of 5.5 km of single carriageway to dual carriageway commenced in June 2000. The scheme runs from Kilmacanogue village to the existing dual carriageway at the southern end of the Glen of the Downs. The project includes two interchanges.

It opened to traffic in October, 2003.

Prior to construction, environmental concerns were raised over the proposed removal of trees from the Glen, but less than one percent of trees were actually felled, and many thousands of trees were subsequently planted along the scheme to replace them.

In 2003, the Infra Eco Network Europe (IENE), a network of some twenty countries, produced the COST 341 Handbook, aimed at minimising ecological barriers and the fragmentation effects of transportation infrastructure on wildlife. A compensatory habitat, provided as part of the N11 Glen of the Downs Landscape Mitigation Masterplan, featured in the handbook as an example of best practice in this area.

Ashford-Rathnew Bypass

The road improvement scheme involved the construction of 13.6 km of dual carriageway, bypassing Ashford and Rathnew. Construction commenced in March 2002, and was completed in September 2004, removing an estimated 20,000 vehicles a day from these two villages.

Gorey Bypass

This 23 km project saw the construction of dual carriageway between Clogh and the Arklow bypass, and included a bypass of Gorey town. The scheme started in November 2005, and was completed in September 2007, four months ahead of schedule.

The bypass has removed 10,000 vehicles each day from Gorey town and the villages of Inch and Clogh.

N15 Ballyshannon/Bundoran Bypass

Construction of a two lane roadway on the 10.8 km stretch of national primary route began in July 2004. It bypasses the towns of Ballyshannon and Bundoran, and was part of the Authority's programme to upgrade the N15 Sligo to Lifford Road. The project included a new bridge over the Erne River. The bypass opened in April 2006, and forms part of the Atlantic Road Corridor.

Up to 9,000 vehicles a day have been taken off the main streets of the two towns.

N18 Newmarket-on-Fergus

Opened in September 2002, the 5.7 km scheme relieved the traffic bottleneck that existed in the village of Newmarket-on-Fergus. The new dual carriageway has interchanges at Carrigoran and Dromoland.

N18 Ennis Bypass

Construction on the 14 km scheme began in April 2004. Built to high quality dual carriageway standard, it bypasses Ennis and Clarecastle, and links Dromoland to a point south of Crusheen village. A number of other N18 schemes (including the Newmarket-on-Fergus and Gort to Cusheen schemes) were completed in the period 2002 to 2007, providing almost 40 km of high quality road on the Galway to Limerick route, which also serves Shannon Airport.

After it was completed, in January 2007, it removed over 20,000 vehicles from the streets of Ennis every day. The bypass forms part of the Atlantic Road Corridor.

N25/N27 Kinsale Road Interchange.

**N25 Kilmacthomas**

The Kilmacthomas bypass is located on the N25 between Waterford City and Dungarvan. It forms part of the E30 Euroroute connecting Cork to the port of Rosslare. The project involved the realignment of 8.4 km of wide single carriageway between McGrath's Cross and Scrahan. Construction commenced in 1999 and the road was opened in September 2001.

The bypass replaced a substandard section of roadway, including a railway overbridge which was the scene of numerous accidents.

N25/N27 Kinsale Road Interchange

This was just one of three major road schemes opened in Cork in 2006. The Kinsale Road Interchange replaced one of the busiest roundabouts south of Cork City on the South Ring Road, resulting in significant time saving benefits and reduced congestion.

The scheme is 2.4 km in length and includes an 8 metre high flyover carrying the N25 Cork South Ring Road over the Kinsale Road roundabout. Started in June 2005, the scheme was opened in October 2006.

National Secondary Road Schemes

The N51 Navan Inner Relief Road runs west of Navan Town and connects the N3 Kells Road to the N51 Athboy Road. The 1 km standard two lane road includes two railway bridges, a T-type junction and two roundabouts. It was completed in May 2009. The Inner Relief road was subsequently complemented by an additional 4 km of road which was provided as part of the M3 motorway project. This link road forms part of the N51 which connects the north and west of Navan to the Athboy Road Interchange on the M3.

The N52 is a national secondary route providing a strategic link between Dundalk and Nenagh. A number of schemes were completed along its length to improve access and reduce journey times. These include:

- The 4 km Nenagh Bypass, which dates back to 2001. It links the former N7, to the west of the town, with the strategic N52 Nenagh-Tullamore-Dundalk route to the north.
- The 4.9 km Mullingar Bypass was opened in August 2006. The scheme, which commenced in November 2004, incorporates four roundabouts and two bridges.
- The 4.2 km Mullingar Belvedere Road Improvement Scheme opened in May 2007. It links the Mullingar Bypass to the N52 at Carrick Bridge.
- The 14 km Tullamore Bypass, which opened in October 2009, involved the construction of seven roundabout junctions, three river crossings, a canal crossing and a railway crossing.

The N71 Skibbereen Relief Road is a 1.1 km bypass which removed 9,000 vehicles per day from the town centre upon opening. It was completed in December 2003, and reduced journey times by up to 20 minutes at peak times. It includes a 70 metre three span bridge over the Ilen River.

The N77 Kilkenny Ring Road is a 4.2 km wide single carriageway, which includes a bridge over the Kilkenny to Dublin railway. It was completed in December 2007.

These are just some of the many secondary road schemes completed during the decade.

M1, River Boyne Bridge under construction.

STORY 3: BOYNE BRIDGE

The Boyne River has rich historical, archaeological and even mythical associations for the Irish people. It flows near Trim Castle and the Hill of Tara on its passage to the medieval city of Drogheda. Building a new road bridge over the river was always going to be a difficult task, given the Boyne's history and the environment of this highly sensitive area.

The selected route for the M1 motorway crosses the river approximately 3 km west of Drogheda, where the River Boyne is 150 metres wide and flows either side of Yellow Island. The preliminary design of the Boyne Bridge was completed in June 1994, and, in April 1995, the Environmental Impact Statement (EIS) was published. The EIS for the Boyne Bridge was so significant that it was separate from the EIS conducted for the motorway.

Environmental Implications

This EIS detailed the issues and constraints that influenced the bridge design. They can be summarised as follows:

Heritage

The Boyne Valley is one of the most historically significant sites in Ireland. The ancient monuments of Newgrange, Knowth and Dowth lie within 3 km to 5 km of the crossing. The three main Williamite crossings of the river at the Battle of the Boyne, in 1690, took place near the bridge site.

Flora and Fauna

The EIS concluded that the site for the proposed bridge represents the most ecologically important area along the proposed motorway. Eight distinct habitats were identified, all showing a diversity of flora and fauna species.

Amenity

Walkers and anglers make considerable use of the southern bank of the river along the Oldbridge Road.

Physical Conditions

Within the river channel, on Yellow Island and in the tidal reed beds to the north of the river, the presence of soft alluvial conditions, mudflats and fluctuating tidal water levels would make the construction of bridge substructures very difficult, irrespective of environmental considerations.

Location

The Boyne Valley is an area of outstanding natural beauty. The aesthetic merit of any design was, therefore, regarded as probably the single most important factor to be considered.

In response to these constraints, the bridge design incorporated the following aims:

- Be compatible with the river valley
- Make a positive visual statement
- Cause minimal interference to flora and fauna
- Cause minimal intrusion onto the Battle of the Boyne site
- Cause minimal loss of amenity during construction
- Be the design which best meets the design constraints, and not necessarily the cheapest.

The bridge design also had to contend with the difficulties presented by the area's topography. The ground on the south bank is elevated, with a sharp drop, while the north bank has a gentle gradient down to the river.

The bridge construction contract was awarded in late 1999, with the contract signed in April 2000. Construction began in May 2000.





Construction of the Boyne Bridge

The selected design was a cable-stayed bridge. This would provide the optimum solution to environmental concerns and topographical challenges. While the preferred option cost more than a standard road bridge, it allowed a much longer main span, which meant there was no need for the traditional supports in the riverbed. This ensured that the river, the reed beds and Yellow Island were protected.

The bridge is 352.5 metres long and features a maximum clear deck span of 170 metres, which is supported by twenty eight fanned cables, fourteen on each side of the deck. Each cable connects to a 95 metre high reinforced concrete 'A' frame pylon. Innovative construction features and techniques were incorporated in the final solution, including wind shielding along the length of the bridge, erecting the main span by launching it from the south abutment, and using the 'A' frame pylon to support the deck with two pairs of temporary stays.

The resulting asymmetric cable-stayed bridge is a stunning and attractive design with a dramatic visual impact. So much so that it won the 2006 Excellence Award (Civil) from the Association of Consulting Engineers of Ireland. It was the longest bridge of its kind in the country before the 465 metre bridge crossing the River Suir, on the Waterford City Bypass, opened in 2009.

The Boyne Bridge is located on the Gormanston to Monasterboice section of the M1 Northern Motorway, which connects the Balbriggan Bypass to the Dunleer Bypass.

THE BENEFITS

The first decade of the 21st century saw the building of a modern road network in Ireland. The inter-urban routes formed the backbone of this development but there were many other national primary and secondary road schemes built throughout the country.

This new road network is a long term and vital investment which will be used by future generations and will support the economy's development for decades to come.

When the development programme was launched in 2000, many believed the ambitious road infrastructure targets could not be achieved. The scale and complexity was beyond anything Ireland had attempted before and the timeframe was ambitious. It was acknowledged, however, that without such a road network, Ireland's progress would be curtailed.

Despite the size of the challenge the network was delivered as planned. The comprehensive improvements benefit both the economy and the entire community.

The general public and businesses benefit from much safer, faster and more reliable journey times. Transport costs are reduced, not just as a result of time saved but also because of reduced wear and tear, and reduced fuel consumption. The modern network gives improved access to markets for business, facilitates regional development and gives rise to agglomeration benefits. Bypassed towns and villages benefit greatly from improved air quality, reduced congestion and from those in their hinterlands being better able to access the towns and villages.

During the course of the decade the capabilities of the participants evolved and improved, including those of the Authority itself. Indeed, in the later years of the decade the efficiency and effectiveness of the delivery of the network was amongst the best in the world. Many Irish construction companies and engineering firms acquired expertise that they are now employing around the world.



M50 Blanchardstown Interchange.



N5 Charlestown Bypass under construction.

The direct benefits of the road network investment are over three times their cost. When indirect benefits are also appraised, the overall benefits are greater still. This makes the new road infrastructure one of the best investments ever made by the Irish State.

Whatever the future holds, all involved have delivered a remarkable legacy that will continue to play a critical role in Ireland's progress and success.



R747 Athy to Ballitore, Co. Kildare.



M7 Naas Road, Kill Interchange.

Appendix I

ROUTE	SCHEME	LOCAL AUTHORITY	CONTRACTOR	Consulting Firm that was Employers Representative/Engineer (Construction Stage)	YEAR OPENED	ROAD TYPE
2000 Completions						
N7	Nenagh Bypass	North Tipperary County Council	Coffey Construction	Limerick NRDO	2000	Single Carriageway
N9	Moone/Timolin	Kildare County Council	SIAC Construction	Kildare NRDO	2000	Single Carriageway
M50/N4/N7/ Ballymount	Free Flow Slips	South Dublin County Council	Clonmel Enterprises Ltd.	Arup	200	Junctions
M50/M1	Free Flow Slips	Fingal County Council	C&M Construction	McCarthy Atkins/Aer Rianta	2000	Junctions
N72	Killarney Northern Road II	Kerry County Council	Kerry Co Co Direct Labour	Kerry Co Co	2000	Single Carriageway
2001 Completions						
M1	Dunleer/Dundalk	Louth County Council	Graham - Uniform J.V	MC O'Sullivan	2001	Motorway
M1/N2	Dunleer/Ardee Link	Louth County Council	Padhraic Moneley Ltd.	Roughan O'Donovan	2001	Single Carriageway
N4	McNeads Bridge to Mullingar	Westmeath County Council	Coffey Construction	Babtie Petit	2001	Dual Carriageway
N4	Joanstown to County Boundary (Rathowen)	Westmeath County Council	Direct Labour by WCC	Westmeath County Council	2001	Single Carriageway
N15	Clar - Barnesmore	Donegal County Council	Wills Bros Ltd.	Donegal County Council	2001	Single Carriageway
N20	Blackpool Bypass	Cork City Council	Roadbridge Ltd	Malachy Walsh & Partners - Phase III only	2001	Dual Carriageway
N20	Croom Bypass	Limerick County Council	Coffey Construction	Limerick Co Co	2001	Single Carriageway
N20/N21	Adare/Limerick	Limerick County Council	Mulcair Ltd. (Now Roadbridge)	Limerick Co Co	2001	Dual Carriageway
N21	Ballycarthy to Killally	Kerry County Council	Wills Bros Ltd.	Kerry Co Co	2001	Single Carriageway
N24	Beary's Cross to Grange Cross	Limerick County Council	Whelan Quarries	Limerick County Council	2001	Re alignment
N25	Kilmacthomas Bypass	Waterford County Council	BEC Priority Ltd. (BPL)	Waterford Co Co	2001	Single Carriageway
M50	Southern Cross Route	Dun Laoghaire Rathdown County Council	Ascon Ltd.	Mott MacDonald	2001	Motorway
N52	N52 Link to Nenagh Bypass	Tipperary North County Council	Clare Civil Engineering Ltd.	North Tipp Co Co	2001	Single Carriageway
N56	Mountcharles Bypass	Donegal County Council	Wills Bros Ltd.	Donegal County Council	2001	Single Carriageway
2002 Completions						
N4	Enfield Relief Road	Meath County Council	F & F Civil Engineering	West Consult	2002	Single Carriageway
N9	Grannagh - Waterford Phase 1B	Waterford City Council	Jons Civil Engineering	Atkins	2002	Dual Carriageway
N15	Bunduff/Drowes River (Leitrim)	Leitrim County Council	Priority Construction Ltd.	Leitrim Co. Co.	2002	Single Carriageway
N17	Knock/Claremorris	Mayo County Council	BEC Priority Ltd. J.V.	Carl Bro	2002	Single Carriageway
N18	Ballycasey/Dromoland (Newmarket on Fergus)	Clare County Council	Wills Bros Ltd.	Clare Co Co	2002	Dual Carriageway
N22	N22 Bealagrellagh/Gortatlea	Kerry County Council	Wills Bros Ltd.	Kerry Co Co	2002	Single Carriageway
N24	Piltown/Fiddown	Kilkenny County Council	Jons Civil Engineering	Kilkenny Co Co	2002	Single Carriageway
N25	Camaross	Wexford County Council	Priority Construction Ltd.	Wexford Co Co	2002	Single Carriageway
2003 Completions						
M1	Cloghran/Lissenhall	Fingal County Council	Ascon / Nuttal J.V.	Fingal County Council	2003	Motorway
M1	Lissenhall/Balbriggan	Fingal County Council	SIAC Construction	Fingal County Council	2003	Motorway
M1	Drogheda Bypass	Meath County Council	C6 SIAC Cleveland /C7 SIAC O'Rourke/C8 Uniform	Northconsult(JV MCOS,ROD and Atkins)	2003	Motorway
M4	Celbridge Interchange	Kildare County Council	John Sisk & Son Ltd.	Roughan & O'Donovan	2003	-
M7	Kildare Bypass	Kildare County Council	Pat Mulcair Civil Engineering Ltd.	Kildare NRDO	2003	Motorway
N8	Watergrasshill Bypass	Cork County Council	Bowen / Mowlem JV	Atkins McCarthy	2003	Dual Carriageway
N11	Glen of the Downs	Wicklow County Council	Ascon Ltd.	RPS (M C O Sullivan)	2003	Dual Carriageway
N18/19	Hurlers Cross & N19	Clare County Council	Pat Mulcair Civil Engineering Ltd.	White Young Green	2003 (N18) 2003(N19)	Dual Carriageway
N25	Youghal Bypass	Cork County Council	Ascon Ltd.	Carl Bro	2003	Single Carriageway
M50	Second Westlink Bridge	PPP	Sisk / Strabag J.V.	Arup	2003	-
N71	Skibbereen Bypass	Cork County Council	Clare Civil Engineering Ltd.	RPS (M C O Sullivan) (Ilen Bridge only)	2003	Single Carriageway

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ROUTE	SCHEME	LOCAL AUTHORITY	CONTRACTOR	Consulting Firm that was Employers Representative/Engineer (Construction Stage)	YEAR OPENED	ROAD TYPE
2004 Completions						
N4	Hughstown - Meera	Roscommon County Council	Noel Regan & Sons	Roscommon CoCo	2004	Single Carriageway
N5	Strokestown/Longford(Scramoge)	Roscommon County Council	Wills Bros	McCarthy-Hyder Consulting Engineers	2004	Single Carriageway
M7	Monasterevin Bypass	Kildare County Council	Roadbridge Sisk J.V.	Arup	2004	Motorway
N7	Parkway (Capped Contribution)	Limerick City Council	Whelan Limestone Quarries (Contracts) Ltd	Limerick City Co	2004	Dual Carriageway
N7	Limerick SRR Phase 1	Limerick County Council	Uniform Construction Ltd.	Limerick Co Co	2004	Dual Carriageway
N8	Cashel Bypass	South Tipperary County Council	Roadbridge Ltd.	N/A - Tramore House NRDO	2004	Dual Carriageway
N11	Rathnew/Ashford Bypass	Wicklow County Council	SM Morris / Sisk J.V.	Arup	2004	Motorway
N22	Ballinacollig Bypass	Cork County Council	GAMA / Tubin	MC O'Sullivan	2004	Dual Carriageway
N26	Ballina/Bohola Phase 1	Mayo County Council	Noel Regan & Sons	Mc Carthy Hyder Tobin	2004	Single Carriageway
M50	M50/N11 Wyattville Interchange	Dun Laoghaire Rathdown County Council	Jons Civil Engineering	MC O'Sullivan	2004 - no official opening	-
2005 Completions						
N1	Dundalk Western Bypass PPP	Louth County Council/PPP	Celtic Roads Group Ltd.	North Consult	2005	Motorway
N2	Carrickmacross Bypass	Monaghan County Council	Jons Moneley	Roughan and O Dononvan	2005	Single Carriageway
N4	Kilcock Kinnegad PPP	Westmeath County Council / PPP	Eurolink	West Consult (ROD/ MCOS JV)	2005	Motorway
N4	McNeads Bridge Kinnegad	Westmeath County Council	P.T. McWilliams	Jacobs (Formerly Babtie Petit)	2005	Motorway
N4	Sligo Inner Relief Road	Sligo County Council	Ascon Ltd.	Atkins	2005	Dual Carriageway
N6	Loughrea Bypass	Galway County Council	Wills Bros.	MC O'Sullivan	2005	Single Carriageway
N21	Ballycarthy Tralee	Kerry County Council	Denis Moriarty The Kerries Ltd.	Kerry Co Co	2005	Single Carriageway
N22	Gortalea Farranfore	Kerry County Council	Sorenesen Civil Engineering	Kerry Co Co	2005	Single Carriageway
M50	South Eastern Motorway	Dun Laoghaire Rathdown County Council	Ascon Ltd.	MC O'Sullivan	2005	Motorway
2006 Completions						
N2	Ashbourne Bypass - M50 Jcn	Meath County Council	Jons Sisk J.V.	Roughan and O' Donovan	2006	Motorway
N2	Monaghan Town Bypass	Monaghan County Council	O'Kane Exc. Ltd.	RPS	2006	Single Carriageway
N4	Edgeworthstown Relief Road	Longford County Council	Noel Regan and Sons (Plant Hire) Ltd.	Longford Co Co/ Michael Punch & Partners (Strs)	2006	Single Carriageway
N7	Naas Road Upgrade	Kildare County Council / South Dublin County Co.	Clonmel Laing O'Rourke J.V.	Halcrow Barry	2006	Dual Carriageway
N8	Fermoy Rathcormac Bypass	Cork County Council	Direct Route	PCP Consulting	2006	Motorway
N8/73	Mitchelstown Relief Road	Cork County Council	Roadbridge Ltd.	PCP Consulting	2006	Single Carriageway
N15	Ballyshannon Bundoran Bypass	Donegal County Council	SIAC/ Wills J.V.	Jacob Babtie	2006	Single Carriageway
N15	N15/R280 Link Road Scheme	Donegal County Council	SIAC/ Wills J.V.	Jacob Babtie	2006	Junction
N21	Castleisland Abbeyfeale	Kerry County Council	Jons Civil Engineering	Kerry Co Co/Jacobs Babtie	2006	Single Carriageway
N25	Kinsalebeg	Waterford County Council	Noel Regan Ltd.	Waterford NRDO	2006	Single Carriageway
N25	Kinsale Road Interchanges	Cork City Council	Ascon Ltd.	Arup Consulting Engineers	2006	Junction
N30	Enniscorthy Clonroche	Wexford County Council	Priority Construction Ltd.	Waterford NRDO	2006	Single Carriageway
M50	Dublin Port Tunnel	Dublin City Council	Nishimatsu-Mowem-Irishenco Consortium	Kellogg Brown & Root	2006	Motorway
N52	Mullingar Bypass	Westmeath County Council	Noel Regan & Son	PCP Consulting (Parkman, Carl Bro Punch JV)	2006	Single Carriageway
N55	Cavan Bypass	Cavan County Council	Priority Construction Ltd.	Cavan County Council/ROD on Bridges	2006	Single Carriageway

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ROUTE	SCHEME	LOCAL AUTHORITY	CONTRACTOR	Consulting Firm that was Employers Representative/Engineer (Construction Stage)	YEAR OPENED	ROAD TYPE
2007 Completions						
N1	NI Border / Dundalk	Louth County Council	Northroute (SIAC Ferrovial J.V.)	Mouchel/Parkman	2007	Dual Carriageway
N2	Castleblaney Bypass	Monaghan County Council	GAMA Tubin Construction Ltd.	Atkins	2007	Dual Carriageway
N4	Dromod Roosky	Leitrim County Council	Jons Civil Engineering Ltd.	Roughan & O'Donovan	2007	Reduced Dual
N5	Charlestown Bypass	Mayo County Council	SIAC Wills J.V.	Ryan Hanley WSP	2007	Single Carriageway
N6	Kinnegad / Kilbeggan	Westmeath County Council	Ascon Ltd.	Roughan & O'Donovan, Ryan Hanley WSP	2007	Motorway
N11	Enniskerry Junction Improvement	Wicklow County Council	Ascon Ltd.	Roughan & O'Donovan	2007	Bridge
N11	Arklow/Gorey Bypass	Wexford County Council	Roadbridge Ltd.	Wexford Co Co	2007	Motorway
N18	Ennis Bypass	Clare County Council	Gama Strabag J.V.	Jacobs	2007	Dual Carriageway
N52	Mullingar - Belvedere	Westmeath County Council	P.T. McWilliams	Halcrow Barry	2007	Single Carriageway
N56	Mountaintop to Illistrin	Donegal County Council	Ph1 - Wills Bros.; Ph2 - Noel Regan & Son	Donegal County Council	2007	Single Carriageway
N77	Kilkenny Ring Road Extension	Kilkenny County Council	Regan Civil Engineering Ltd.	Atkins	2007	Single Carriageway
2008 Completions						
N6	Kilbeggan Athlone	Westmeath County Council	Ascon Ltd.	Roughan & O'Donovan, Ryan Hanley WSP	2008	Motorway
N8	Cashel Mitchelstown	South Tipperary County Council	Roadbridge Sisk J.V.	Halcrow Barry	2008	DC/Motorway
N8	Cullahill Cashel	Kilkenny County Council	Roadbridge Sisk J.V.	Malone O'Regan / Scott Wilson	2008	DC/Motorway
N9	Carlow Bypass	Kildare County Council	Ascon Ltd.	Roughan & O'Donovan Faber Maunsell	2008	Dual Carriageway
N11	Kilpeddar Delgany Jnc	Wicklow County Council	John Sisk & Son	Roughan & O'Donovan	2008	Interchange
M50	M50 Upgrade Phase 1	South Dublin County Council	SIAC Ferrovial M50 J.V.	Arup Consulting Engineers	2009	Motorway
M50	M50 Upgrade Phase 3	Fingal County Council	Jons Civil Engineering Company Ltd.	Arup Consulting Engineers	2008	Motorway
2009 Completions						
N4	Leixlip to M50 junction	South Dublin County Council	Jons Civil Engineering	ROD	2009	Dual Carriageway
N6	Athlone Ballinasloe	Galway County Council	SIAC Wills J.V.	Jacobs	2009	Motorway
N6	Galway to Ballinasloe PPP	Galway County Council / PPP	ICON	RPS	2009	Motorway
N8	Fermoy to Mitchelstown	Cork County Council	Roadbridge Ltd.	Halcrow Barry	2009	Motorway
N9	Kilcullen to Carlow	Kildare County Council	Roadbridge Ltd.	Roughan & O'Donovan Faber Maunsell	2009	Motorway
N25	Waterford City Bypass PPP	Waterford City Council / PPP	Celtic Roads Group	Mott MacDonald	2009	Dual Carriageway
N51	Navan Inner Relief Road	Meath County Council	Regan Civil Engineering	Ryan Hanley	2009	Single Carriageway
N52	Tullamore Bypass	Offaly County Council	Graham P.T. McWilliams	Jacobs	2009	Single Carriageway
2010 Completions						
N3	Clonee to North of Kells PPP	Meath County Council	Eurolink	N3 Meath Consult (JV Arup, Halcrow Barry, RPS)	2010	Motorway
N7	Castletown to Nenagh	Laois County Council	Samogue Bowen	White Young Green	2010	Motorway
N7	Limerick Tunnel PPP	Limerick County Council / PPP	Direct Route (Limerick) Ltd.	RPS/COVI	2010	Dual Carriageway
N7	Nenagh/Limerick	Limerick County Council	Bothair Hibernian N7 J.V.	RPS	2010	Motorway
M7/M8	Portlaoise to Cullahill/C'town PPP	Laois County Council / PPP	CRG Consortium	Arup Consulting Engineers	2010	Motorway
N9	Carlow to Knocktopher	Kilkenny County Council	Roadbridge Sisk J.V.	Kilkenny Consult (Arup Roughan & O'Donovan)	2010	Motorway
N9	Waterford Knocktopher	Kilkenny County Council	BAM Civil	Kilkenny Consult (Arup Roughan & O'Donovan)	2010	Motorway
M18	Gort Crusheen	Galway County Council	SIAC Wills J.V.	Jacobs	2010	Motorway
N21	Castleisland Bypass	Kerry County Council	BAM Civil	Jacobs	2010	Dual Carriageway
M50	Upgrade Phase 2 PPP	FCC / SDCC / DLRCC / DCC / PPP	M50 Concession Ltd.	Roughan O'Donovan Ltd	2010	Motorway
Var	Motorway Service Areas Tranche 1	National Roads Authority	Superstop Consortium	Halcrow Barry	2010	-

Please Note: Any Major Contractors Not Noted, Please Contact the National Roads Authority for Clarification.



Vessel 2 faced bowl.



Drinking horn terminal.



Mesolithic fish trap.



Prehistoric and early medieval burials.