



Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Public Private Partnership Post Project Reviews

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1. Introduction

Commencing with the National Development Plan 2000-2006 and through to the current National Development Plan 2018-2027 the Government has identified a role for Public Private Partnerships (PPPs) as a means of delivering critical public infrastructure. In line with Government policy, TII has entered into fifteen PPP Contracts including two PPP contracts for the provision of motorway service areas. As part of the ongoing appraisal and evaluation of its PPP investments, TII has to date completed Post Project Reviews (PPRs) on ten of the PPP Contracts¹. These PPRs are now being published pursuant to Circular 06/2018 from the Department of Public Expenditure & Reform. This note provides an overview of the origins of TII's PPP Programme, the scheme evaluation process undertaken, the main findings from the completed PPRs along with ongoing TII initiatives to strengthen the scheme appraisal process.

2. Government Policy

TII's procurement of projects through a PPP² mechanism originates from June, 1999, when the then Minister for Finance announced three pilot PPP roads projects for implementation using the PPP mechanism. Those projects were:

- the N25 Waterford By-Pass,
- the Limerick Southern Ring Road Phase II, and
- the construction of a second bridge at West-Link on the M50 in Dublin.

In December 1999, the Government published the National Development Plan 2000-2006 which identified additional PPPs as an essential component in contributing to the financing and delivery of a significant programme of national road improvement schemes. Subsequent National Plans including the Infrastructure and Capital Investment 2012-16, the Stimulus Plan 2012 and Building on Recovery: Infrastructure and Capital Investment 2016-2021 all identified road schemes to be progressed using PPP as the delivery mechanism.

The current National Development Plan 2018 – 2027 acknowledges the role PPPs have played in delivering important infrastructure particularly in times of constrained Exchequer resources. The Plan also provides that: *“All large-scale projects included in the new National Development Plan should, therefore, continue to be assessed in terms of suitability for procurement by PPP and/or alternative financing, in particular projects which involve user charges or which offer the potential to generate significant third party income.”*

In response to Government policy, TII entered into fifteen PPP Contracts including two PPP contracts for the provision of motorway service areas. Of the thirteen road PPPs, eleven are in operational phase while two are currently under construction (i.e., the M11 Gorey-Enniscorthy scheme and the N25 New Ross Bypass Scheme both of which are due to open in 2019). PPP operated roads currently comprise

¹ PPRs will be completed on the four remaining PPP schemes following a suitable period of operations - two schemes opened to traffic relatively recently (N11 Arklow/Rathnew (including N7 Newlands Cross upgrade) in July 2015 and N17/N18 in September 2017) and two are currently in construction stage.

² An overview of PPPs in Ireland is available from the Parliamentary Budget Office: An overview of Public Private Partnerships in Ireland, PBO Briefing Paper 5 of 2018

some 33 per cent of the State's c.1270km of motorway/dual carriageway network. Of the motorway service contracts, one is operational and the other is at construction stage.

3. PPP Contract Payment Mechanism

Each of the roads in the TII's PPP roads programme is the subject of Design Build Finance Operate Maintain (DBFOM) contracts. However, within the thirteen roads, there are different payment methods (otherwise known as the payment mechanism) contemplated by the contracts. Eight of the schemes are toll roads and the PPP Companies' income is largely derived from toll revenues generated by the road with the PPP Companies also receiving certain payments from TII³. In the case of the other five road schemes user charges do not apply with the PPP Companies receiving payments from TII (referred to as availability payments) in consideration for its obligations under the relevant PPP contracts. (See Appendix 1 for complete list of PPP contracts entered into by TII.)

4. Post Project Reviews

In line with the Public Spending Code⁴ and Common Appraisal Framework⁵ PPR reports are to be completed where schemes have been in operation for a number of years. The PPRs completed on TII's PPP schemes to date are listed in Table 1 below.

Table 1. TII Post Project Reviews

Subject of Post Project Review ⁶	Date Completed
N25 Waterford Bypass	December 2012
Dundalk Western Bypass	April 2014
N4 Kilcock Kinnegad	April 2014
N8 Rathcormac to Fermoy Bypass	April 2014
M50 Upgrade	January 2015
M7-M8 Portlaoise to Cullahill-Castletown	January 2015
M6 Galway to Ballinasloe	January 2015
M3 Clonee to Kells	January 2015
Limerick Tunnel	May 2015
Tranche 1 Motorway Service Areas	November 2013

³ In the case of six of the toll concession PPPs, traffic risk rests entirely with the PPP Co. In the case of two of the PPP Contracts, i.e. the M3 Clonee-Kells Scheme and the N18 Limerick Tunnel, the relevant PPP Contract provides for a sharing of downside traffic risk (referred to as Variable Operation Payments or traffic guarantees) between the PPP Co and the Authority. All toll concession contracts include revenue sharing with TII in the event that traffic volumes exceed traffic volumes specified in the particular PPP Contract.

⁴ Department of Public Expenditure and Reform "Public Spending Code", available at www.publicspendingcode.per.ie. Prior to September 2013 the guidelines in force were the "Guidelines for the Appraisal and Management of Capital Expenditure Proposals in the Public Sector. Department of Finance, February 2005, as amended by the Value for Money Circular of January 2006.

⁵ Department of Transport, Tourism and Sport "Common Appraisal Framework for Transport Projects and Programmes" March 2016. Available at www.dttas.ie

⁶ The N25 Waterford Bypass Post Project Review was completed by Mott MacDonald. All other Post Project Reviews were completed by AECOM Limited.

These PPRs were carried out as part of TII's ongoing appraisal and evaluation of its investments in road infrastructure. The PPR reports were written for an audience of TII decision makers and other stakeholders involved in decision making on road investments. As the PPRs were prepared as an internal report they have not been copy edited to the standard that TII would apply to a document intended for a wider audience. In some cases, it should be noted that there are errors in the reports with such errors ranging from typographical errors to in a small number of cases of incorrect statements or errors in interpretation of the data (which have been identified as a consequence of subsequent reviews). For reasons of transparency the reports themselves have not been modified to reflect these corrections. An Erratum sheet has been inserted where required.

Appendix 2 to this note also includes a glossary of terms used in the value for money assessment of Toll Concession PPPs.

This note also sets out some background detail on how TII makes investment decisions and the role and purpose of PPRs in this process. As noted in the PPR reports the investment appraisal process that was in place at the time the schemes listed in Table 1 were being appraised was not as comprehensive as the appraisal process that currently applies. The current appraisal process is set out in the following section.

5. TII Investment Decisions

As TII's investments in road infrastructure are publicly funded, its investment activity is subject to the general rules on public investment set out in the Public Spending Code. In addition, TII must comply with the detailed rules and guidance for applying the Public Spending Code in the transport sector set out in the Department of Transport, Tourism and Sport (DTTAS) Common Appraisal Framework.

TII has developed and published detailed Project Appraisal Guidelines⁷ that set out a detailed procedure for conceiving, planning and implementing a road infrastructure investment in accordance with the standards set by the Department of Public Expenditure and Reform (DPER) and DTTAS. These guidelines cover (amongst other things):

- Identifying the need for an investment in infrastructure and the objectives that the investment must serve;
- Considering a range of alternatives and options to meet this need;
- Transport Modelling to quantify the forecast demand for the investment and its effect on travellers;
- Cost Benefit Analysis to compare the economic cost of the investment with the benefits that will be realised. These benefits can include time savings for transport users, accident costs savings and reductions in emissions and reductions in travel costs;
- Preparing a Business Case for public funding for a road investment; and,
- Carrying out Post Project Reviews of road investments.

⁷ Transport Infrastructure Ireland "Project Appraisal Guidelines" October 2016. Available at www.tiipublications.ie. Prior to October 2016 the "NRA Project Appraisal Guidelines" were in use.

6. Public Private Partnership Procurement

Notwithstanding Government policy, which identified particular schemes for delivery as PPPs, all schemes were subject to economic viability analysis. The decision to proceed with a road investment on a PPP basis can be thought of as a two-step process.

First, the economic case for the road in question is appraised in the same way as a proposal to build a road in the conventional “traditional procurement” way. In particular, a cost benefit appraisal of the proposed road investment is prepared. This cost benefit appraisal is based on the full cost of the road to society as a whole, regardless of who pays the cost, and on the full benefit of the road investment.

Second, if the result of the appraisal is that the road project is worthwhile, TII can then consider the procurement options for the road which may include the option of using PPP. In line with PPP guidance⁸, PPP schemes require a value for money (VFM) assessment to be completed. This assessment consists of comparing the traditional procurement option to the cost to the State of the PPP tender. A “Financial Comparator” (also referred to as a Public Sector Benchmark) is prepared which is an estimate of the cost of delivering the road in the conventional way (i.e., where the State awards a contract for the design and build of the road infrastructure and the State awards separate contracts for the ongoing operation and maintenance along with lifecycle renewal works on a scheme).

The Financial Comparator is prepared before the results of the tender competition are known. The VFM test is satisfied where the cost to the State of the PPP option as tendered is less than the estimated cost of traditional procurement as provided for in the Financial Comparator. The VFM comparison takes into consideration the costs of the scheme under both procurement options, the risks transferred to the private sector under both and any non-quantifiable benefits that each procurement option might generate.

Where the road in question is to be a toll road, the Financial Comparator takes into account the projected toll revenue that the public sector would receive if it built the road and collected the toll itself. The Financial Comparator will be compared with the expected cost to the Exchequer of the PPP option. The expected cost of the PPP option will include any projected revenue sharing payments from the PPP Co to the State, or expected payments from the State to the PPP Company.

It is important to note that tolls are not taken into account in the first stage of the appraisal, i.e., the economic appraisal. Tolls are not relevant to calculating the costs and benefits of a road to the economy as a whole. For example, consider a proposal to upgrade the road between two major cities to motorway standard. The current road is congested so the upgrade is expected to deliver time and cost savings for the people and businesses that use the road. The costs taken into account are all of the labour, materials and services used in building and maintaining the new road. The benefits are the value of all of the time savings, vehicle operating cost savings and accident cost savings that the road will deliver. If road users are charged a toll, this is neither a cost nor a benefit to society as a whole. All the toll does is to transfer some of the overall benefit derived from the road from the road user to the body that receives the toll.

⁸ Guidelines for the Provision of Infrastructure and Capital Investments through Public Private Partnerships available from www.ppp.gov.ie

TII provided the VFM analysis completed on each of the projects on the First Roads PPP Programme in its March 2018 information pack to the Public Accounts Committee. These demonstrated that all of the projects offered VFM to the Exchequer when the final tendered cost (which was arrived at following a competitive procurement process) was compared to TII's Financial Comparator.

A key driver of VFM on the First Roads PPP Programme was the risk transfer achieved on these schemes, i.e., the private sector was responsible for significant risks on these projects including demand risk (traffic volumes⁹ and toll inflation), design and construction risk and operational risk post construction, with termination provisions which are very favourable to TII. TII's experience is that there has been extremely limited circumstances where TII have incurred additional costs on these projects, other than traffic guarantee payments as provided for in the PPP Contracts for the Limerick Tunnel and Clonee-Kells scheme and TII instructed variations – i.e., the risk transfer has been effective in practice. While there is a floor to the downside demand risk on two PPP Schemes, through the traffic guarantee mechanism, there is also a mechanism to cap PPP gains through revenue sharing arrangements where traffic volumes exceed contract threshold volumes. Income receivable from revenue share across the eight toll PPPs can be expected to exceed traffic guarantee payment amounts over the PPP contract concession term.

7. Purpose of TII Post Project Reviews

PPRs are included in TII procedures for appraising proposed investments. These reviews follow a requirement in the Public Spending Code and Common Appraisal Framework that large investment projects should have a post project review conducted after they have been in operation for a number of years.

Each of the PPR reviews undertaken on the PPP schemes sets out in detail whether:

- The basis on which the project was undertaken was correct;
- The expected benefits and outcomes materialised;
- All of the relevant appraisal and management procedures and standards were followed; and,
- There are lessons that can be drawn for other investment projects.

8. Completed Post Project Reviews - Lessons Learned

General findings across the respective PPRs undertaken were:

- Schemes were adequately planned both in terms of the statutory procedures, route selection and consultation and the planning undertaken in relation to the decision to procure the scheme as a PPP.
- During the implementation of the schemes, the appropriate management procedures adopted were satisfactory and in line with best practice guidance at the time. The implementation of the schemes as PPPs resulted in schemes being delivered on time or more

⁹ As noted previously in the case of six of the toll concession PPPs, traffic risk rests entirely with the PPP Co. In the case of two of the PPP Contracts, i.e. the M3 Clonee-Kells Scheme and the N18 Limerick Tunnel, the relevant PPP Contract provides for a sharing of downside traffic risk (referred to as Variable Operation Payments or traffic guarantees) between the PPP Co and the Authority. All toll concession contracts include revenue sharing with TII in the event that traffic volumes exceed traffic volumes specified in the particular PPP Contract.

commonly delivered ahead of schedule and in line with the quality specified in the PPP contract.

- The schemes delivered on many of the objectives with the resulting benefits and outcomes including helping to reduce traffic volumes and congestion in towns along the bypassed route, reducing the numbers of fatal accidents and contributed to providing a continuous motorway/dual carriageway network routes.
- Although an economic appraisal was carried out, this was done in many cases a number of years prior to the contract being awarded with no interim re-appraisal to account for changes in cost and traffic forecasts. It is acknowledged that this appraisal approach was in line with the available guidance at the time. It is now a requirement for an updated cost-benefit analysis to be undertaken at various stages of project development and this requirement is set out in TII's Project Appraisal Guidelines.
- Outturn traffic has been below expectations for most schemes. This is in part explained by the impacts of the economic downturn but also raises questions on the accuracy of traffic forecasting techniques particularly in the case of toll roads. This experience on the accuracy of traffic forecasting is in common with many other schemes internationally. TII's forecasts in the main were more conservative than those of the lenders providing debt to the schemes and the forecasts of the equity providers. It is also noted that a number of the schemes opened to traffic in 2010 which coincided with the significant economic downturn, which is not likely to be representative of the full 30 plus year concession period of the schemes.
- In respect of traffic shortfalls on toll concession schemes it was noted that as it is mainly the private sector that took the risk for the financial implications of the reduced traffic volumes. Had the private sector not been responsible for demand risk through tolling, the financial impact on the public sector would have been much greater. As noted earlier, the public sector shares some of the risk for shortfalls in traffic on the M3 Clonee-Kells and the N18 Limerick Tunnel Schemes for which a Variable Operation Payment (or traffic guarantee) mechanism is provided for in the PPP Contract. In this context it should be noted that the level of traffic triggering such a shortfall payment was structured to contribute to PPP Co debt repayments but not the equity invested by the private sector in the scheme.

Additional Public Private Partnership Outcomes

In addition to the financial benefits as quantified through the VFM analysis the PPP programme delivered other benefits, including for example:

- PPP companies made substantial equity investments in these projects and are therefore incentivised to manage risks in a proactive manner to protect their investment. This has been to TII's benefit as issues arising during the construction phase were dealt with in a pragmatic manner to ensure timely delivery and management of risk and cost;
- The PPP Programme was of sufficient scale (both in terms of individual project size and number of projects) to attract international contractors to Ireland. This had the benefit of expanding the contracting base, increasing competition and securing competitive pricing, and bringing new skills and techniques to the industry (most international companies collaborated with local Irish contractors at PPP company, main contractor and/or subcontract level);

- Construction costs were funded through a mix of private sector capital (equity investment and competitively priced project finance debt) and TII funding (in the form of capital and operational payments). This had a number of benefits, including enabling TII to leverage overall State investment and resources to significantly increased output levels than would have been possible solely from Exchequer funding and resources, and
- Under the PPP schemes, the PPP companies are responsible for the long-term asset management and maintenance of these roads. This gives assurances that the roads will be maintained to the standard specified in the PPP Contract over the long-term.

9. Initiatives Enhancing the Investment Appraisal Process

9.1 Enhanced Data Collection

Traffic count data is a critical input to traffic forecast models. In the late 1990's / early 2000s limited traffic count data was available and in a number of cases reliance was placed on short period counts. The last decade has seen significant advancements in traffic counting and monitoring technology available to TII. Related to that improvement, TII set about procuring a comprehensive traffic monitoring system in 2012/2013. This system went 'live' in March 2013. Currently there are approximately 370 such TII Traffic Monitoring Units (TMU) distributed across the National Road network.

This TMU network provides TII with valuable continuous information in real time at a reasonably low cost. This system is in contrast to the system previously available to TII which was not as extensive and due to the age of that technology did not provide as consistent a feed of data as the current TMU system.

The availability of this TMU data, now enables TII to monitor traffic growth trends at national, regional and more local levels in a more comprehensive manner. The availability of such a significant quantity of 'all year round' data also fed into a significant update of the TII National Transport Model.

9.2 Development of TII National Transport Model

9.2.1 Update of the National Transport Model

The availability of significant volumes and coverage of traffic data on the National Road network from early 2013 allowed a subsequent and comprehensive update of the TII National Transport Model (NTpM). The NTpM is an all-Ireland strategic multi-modal transport model that can be used to assess the impact of transport infrastructure and policy. The NTpM incorporates separate models for car traffic, freight, national rail and inter-urban bus, along with an innovative transport behaviour model which allows future transport impacts to be quantified. The NTpM is now available for, and often used as the starting point in, the development of road scheme business cases.

In addition to the 370 TMU now available, the following sources have also been used in the development of the NTpM:

- CSO Census Information (Places of Work and School Census Anonymised Records (POWSCAR));
- National Survey of Transport of Goods by Road provided by CSO; and
- Various additional traffic surveys including origin-destination and journey time surveys.

The convergence of the above sources, alongside the data from the TMU network ensures that TII has a comprehensive knowledge of the quantity and type of traffic using the National Road network.

9.2.2 National Transport Model projections

The update of the NTpM also represented a significant departure in terms of the development of future year scenarios and travel demand projections. The NTpM now includes projections for two future years: 2030 and 2050 and also incorporates Low, Central and High growth scenarios for each such year.

A number of methodologies and procedures are used and assimilated when developing these growth scenarios, including:

- Projections for population, employment and jobs developed by the ESRI;
- Car ownership projections; and
- Goods vehicles projections.

The introduction of the procedures outlined above provide greater assurances in terms of travel demand projections with alternative economic, employment, population and car ownership growth scenarios enabling the production of a range of potential travel demand growth rates.

9.3 Current Project Management & Business Case Processes

The schemes for which the PPRs are being published were constructed in the period between 2003 and 2010. Since then various guidance documents have been published by various Government departments and TII, which provide a more comprehensive set of parameters and a framework within which major road schemes are to be managed and appraised. These documents included the following:

- The Public Spending Code published by the Department of Public Expenditure and Reform (DPER) in 2013;
- Common Appraisal Framework for Transport Projects and Programmes published by the Department of Transport, Tourism and Sport (DTTAS) in 2016;
- TII Project Management Guidelines initially published in 2000, revised in 2010 and again in 2017; and
- TII Project Appraisal Guidelines initially published in 2008 with a significant update in 2011 and further updated in 2016.

These documents ensure that, as part of the development of any modern road scheme, the scheme appraisal and subsequent Business Case is revisited in almost every phase along the design process as shown in Table 2 below. This is in contrast to the appraisal process that was in place pre-2010. Furthermore, the development of any road scheme now includes review by Government Departments. The current process which dictates that the Scheme appraisal and Business Case is updated during each phase of the development of road scheme as more information and scheme

detail becomes available. The development phases and appraisal deliverables are set out in table 2 below.

Table 2. Current Project Management & Business Case Processes

National Roads Project Management Guidelines			Common Appraisal Framework
Phase	Project Phase Description	Appraisal Deliverables	
0 / 1	Scope and Pre-Appraisal / Concept and Feasibility	Project Appraisal Plan and Project Brief	Project Proposal
2	Option Selection	Preliminary Business Case	Preliminary Appraisal
3	Design and Environmental Evaluation	Draft Detailed Business Case	Detailed Appraisal
		Final Detailed Business Case	Approval in Principle
4	Statutory Processes	Revised Detailed Business Case (if necessary)	Final Planning and Design
5	Enabling and Procurement	Updated Detailed Business Case	Invite Tenders
6	Construction and Implementation	Revised Detailed Business Case (if necessary)	Place Contract
7	Closeout and Review	Post Project Review	Implement, Monitor and Evaluate

10. Conclusions

Commencing in 1999, successive National Plans have identified PPP as a means of supplementing Exchequer funding to deliver critical public infrastructure. TII has successfully delivered the roads PPP programme mandated by successive Governments. TII has entered into fifteen road PPP Contracts including two PPP contracts for the provision of motorway service areas. These PPP contracts have an overall capital value of €3.4billion. PPP operated roads currently comprise some 33 per cent of the States c.1270km of motorway/dual carriageway network.

The PPP Roads Programme has enabled TII to leverage overall State investment and resources to significantly increased output levels than would have been possible from Exchequer funding alone. The PPP VFM assessments undertaken demonstrated that all of the projects offered VFM to the Exchequer when the final tendered cost (which was arrived at following a competitive procurement process) was compared to TII's Financial Comparator. The most significant adverse finding in the completed PPRs was that in the early years of operation, traffic has been below expectations for most schemes. In many cases, this traffic risk was transferred to the private sector.

TII has to date completed PPRs on ten schemes and PPRs will be undertaken on the remaining schemes following an appropriate period of operations. The completed PPRs have been undertaken in line with national guidelines as set out in the Public Spending Code and Common Appraisal Framework and also TII's Project Appraisal Guidelines. The PPRs undertaken confirmed that:

- the schemes were adequately planned,
- the appropriate management procedures adopted were satisfactory and in line with best practice guidance at the time,
- forecasting traffic volumes on greenfield toll roads has proved difficult with outturn traffic volumes being lower than forecast. This outturn is in line with international experience of toll road traffic forecasts undertaken in the 1990s/2000s.
- the schemes delivered on many of the objectives with the resulting benefits and outcomes including helping to reduce traffic volumes and congestion in towns along the bypassed route, reducing the numbers of fatal accidents and contributed to providing a continuous motorway/dual carriageway network routes.

APPENDIX 1 PPP ROAD SCHEMES

PPP Toll Concession Schemes

Table A1: PPP Toll Concession Schemes

SCHEME	Description (Project Road*)	OPERATIONS COMMENCED	CONTRACT AWARD/ EXPIRY
M4/M6 Kilcock/Kinnegad – toll	40km motorway	2005	2003/2033
M1 Dundalk Western Bypass – toll	11km motorway & O&M 42km existing motorway with 361m cable stay bridge.	2004	2004/2034
M8 Rathcormac/Fermoy –toll	18km new motorway with 450m viaduct	2006	2004/2034
N25 Waterford City Bypass – toll	23km dual carriageway with 475m cable stay bridge	2010	2006/2036
N18 Limerick Tunnel - toll	10km dual carriageway with 900m immersed tube tunnel	2010	2006/2041
M3 Clonee/Kells – toll	50km Motorway & 10 km dual carriageway	2010	2007/2052
M6 Galway/Ballinasloe – toll	56km motorway	2010	2007/2037
M7/M8 Portlaoise/Cullahill – toll	40km motorway	2010	2007/2037

*Project Road relates to the extent of the works that the PPP Co is responsible for (operations, maintenance & lifecycle) throughout the concession period. The PPP Contract would also have provided for works outside of the Project Road which include link roads, access tracks and accommodation works, etc. These non-Project Road works are taken over by the relevant local authority / land owner following completion and the PPP Companies’ obligations in respect of such non Project Road works is limited to a defects period.

PPRs have been completed on all of the above schemes.

PPPs - Toll Road Schemes – Payment Mechanism

The PPP Co is the recipient of the toll revenue collected. TII also paid construction payments and also can be liable to make operational payments (OP) on PPP Toll Road schemes. The OP amounts payable vary by year and in a number of cases conclude prior to the end of the concession period. The amounts of the construction payments and the OPs were bid as part of the tender process for the award of these contracts.

TII also makes variation payments where Authority instructed variations arise.

Availability Payment Schemes

Table A2: PPP Availability Payment Schemes

SCHEME	Description (Project Road*)	OPERATIONS COMMENCED	CONTRACT AWARD/ EXPIRY
M50 Upgrade	Upgrade of 25km of 2+2 motorway to 3+3, Junction Upgrades and provision of auxiliary lanes / & O&M existing 10km	2007	2007/2042 (35 year term)
N7/N11 Arklow/Rathnew (incl Newlands Cross)	16km new build motorway / Newlands cross junction Upgrade & O&M 30 km of existing N/M11.	2013	2013 / 2040 (25 years post opening of new build M11)
N17/N18 Gort to Tuam	57km motorway	2017	2014 / 2042 (25 years post opening)
M11 Gorey-Enniscorthy	27km motorway	2019 (forecast)	2015/ 2044 (25 years post opening)
N25 New Ross Bypass	14.6km of dual carriageway with 900m bridge	2019 (forecast)	2016 / 2044 (25 years post opening)

On Availability Payment PPP contracts, the upfront construction costs are financed by the private sector which in turn are remunerated by payments (termed Unitary or Availability Payments) made by the contracting authority (in the case of road schemes, TII), with such payments commencing once the service (the road) is available for use. TII also makes variation payments where Authority instructed variations arise.

A PPR has been completed for the M50 Upgrade while the N7/N11 Arklow/Rathnew PPR will be completed in 2018. The N17/N18 Gort to Tuam Scheme opened to traffic in September 2017 while the M11 Gorey-Enniscorthy and N25 New Ross schemes are both at construction stage. PPRs for these latter three schemes will be completed following an appropriate period of operations.

APPENDIX 2 GLOSSARY OF TERMS

Glossary of Terms Used in Value for Money Assessment Table Included in the PPP Toll Concession Post Project Reviews

Section 4 of the PPRs on the Toll Concession PPPs includes details of the Value for Money Assessment. An explanation of the terms used in the compilation of the costs included in the Financial Comparator and the PPP Option are set out below.

Financial Comparator

- **Base costs:** the public sector's estimate of what it will spend to construct, maintain and manage the infrastructure over the period of the contract in accordance with the performance specification as set out in the PPP contract, before allowing for contingencies or risks. This will include construction, design, advisers, supervision, operations and maintenance costs.
- **Toll costs:** the public sector's estimate of what it will spend to construct, maintain and manage the toll infrastructure over the period of the contract in accordance with the performance specification as set out in the PPP contract, before allowing for contingencies or risks.
- **Toll Revenue:** TII's estimate of toll revenue over the contract term.
- **Project risk retained (costs):** these are applied to the Base Costs to reflect an appropriate allowance for the additional costs which can be expected to arise as a consequence of the risks associated with the project. To ensure that the comparison with private sector bids for the PPP project is carried out on a like for like basis, allowances are only included for the risks that the Authority is transferring to the private sector.
- **Lane Occupation Charges:** charges levied on a contractor for closure of side road/link roads during the construction of the scheme.
- **Project risks retained (Revenue):** Revenue or Demand risk is mainly related to the uncertainty associated with:
 - Estimation of future traffic levels and therefore toll revenues, and
 - Revenue risk which includes reduced revenues due to the possibility of limited inflation price increases.

Additional Revenue risk factors that were identified though not assigned a risk value in all cases were:

- **External Developments -;** External developments considers the failure to secure the anticipated level of income from the Project Road due to potential obstacles in tolling in relation to e.g.:
 - Statutory Non-Approval;
 - Delay in Statutory Approval;
 - Reduced revenues due to reduction in toll period, and
 - Reduced rates of toll payment compliance.
- **Incremental cash flows to the Public Sector:** In order to perform a valid VFM assessment, it is necessary to take into account the incremental cash inflows, e.g. taxation, which arise and therefore reduce the net cost of the project from a Public Sector perspective. Such cash flows would include unrecoverable VAT and municipal rates.

PPP Option / Preferred Tenderer

- **Construction Payments and Operational Payments:** Having regard to a tenderers' forecasts of toll revenue (based on TII determined toll rates and tenderers' traffic projections), tenderers were allowed to bid for subvention payments in the form of construction phase payments and operational phase payments from TII.
- **Weighted Average Revenue Share:** Tenderers were also required to make revenue share proposals whereby a percentage of toll revenues, subject to traffic volumes exceeding specified traffic levels, would be payable by the PPP Co to TII as revenue share. The weighted average revenue share reflects TII's estimate of revenue based on TII's traffic forecasts.
- **Contractual mark-ups:** Where Tenderer had negotiated amendments to the tender contract, TII assigned a monetary value, where possible, to the Tenderers' contract amendments.
- **Risks retained in either PPP or PSB:** This provides for risks which are either fully retained or partially retained by TII in a traditional procurement or PPP scenario. Examples of such risks would be Authority instructed variations, risk sharing on archaeology, industrial action and insurance risk share (where applicable).
- **Lane Occupation Charges:** Charges levied on PPP Co for closures of side roads/link roads during the construction of the scheme.
- **Incremental cash flows to the Public Sector:** In order to perform a valid VFM assessment, it is necessary to take into account the incremental cash inflows, e.g. taxation, which arise in a PPP project and, therefore, reduce the net cost of the project from a Public Sector perspective. Such cash flows would include Corporation Tax, VAT and municipal rates.

Additional scheme specific items included in the Preferred Tenderer costs:

Dundalk Western Bypass

- **Weighted Average Royalty Payment:** The PPP Co took over the existing Drogheda Bypass toll facility at contract award. As part of the tender requirements the PPP Co was required to remit a significant proportion of toll revenue collected to TII. This payment was referred to as a royalty fee and applied until the opening of the Dundalk Western Bypass.
- **Revenue from Non Availability Charges:** The PPP Co can be required to pay a Non-Availability Charge to TII in the event of lane closures.

N8 Fermoy/Rathcormac Bypass

- **Professional Indemnity Insurance:** At the time this contract was being tendered Professional Indemnity Insurance had limited availability. On VFM grounds TII elected to defer the requirement to take out PI insurance and reserved the option of instructing the PPP Co to acquire PI insurance at a later date.



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APPENDIX 3 PPP ROAD SCHEMES

Dundalk Western Bypass

Post Project Review



March 2014

Erratum Sheet

Post Project Review reports - Corrections

The Post Project Review reports were not originally intended for an external audience. There are in some cases errors in the reports with such errors ranging from typographical errors to in a small number of cases incorrect statements or errors in interpretation of the data (which have been identified as a consequence of subsequent reviews). We suggest that the following errata are taken into account when reviewing these reports.

2.5. Scheme Operational Performance

2.5.1. *Traffic Outcomes on the New Road (page 9)*

Actual traffic volumes on the scheme in 2013 are higher than those predicted for 2012 in the Scheme Planning stage. An analysis of the actual usage of the tolled motorway compared to forecast usage levels is set out in Section 5.4.

Should read:

Actual traffic volumes on the Dundalk Western Bypass scheme in 2013 are higher than those predicted for 2012 in the Scheme Planning stage. An analysis of the actual usage of the tolled motorway (Drogheda Bypass section) compared to forecast usage levels is set out in Section 5.4.

2.5.3. *Overall Economic Return to the State (page 10)*

Traffic volumes on the scheme have more than met expectations to date. This suggests that users value highly the benefits of the bypass and have not been deterred by the tolls to any significant extent;

Should read:

Traffic volumes on the Dundalk Western Bypass scheme have more than met expectations to date.

4. PPP Procurement Review

4.4. Summary (page 15)

Following a detailed review of the components of the VFM assessment, it was determined that the net cost of the Financial Comparator was potentially overestimated by the order of €13-38m. This is mainly due to more recent traffic forecasts, used for this review, being more conservative than those used for the preparation of the Financial Comparator. Taking account of this review, the FC costs would still remain approximately €122-147m higher than the PPP option. The decision to procure the scheme as a PPP represented value for money for the Exchequer and was the appropriate decision for the scheme.

Should read:

Following a detailed review of the components of the VFM assessment, it was determined that the net cost of the Financial Comparator was potentially underestimated by the order of €13-38m. This is mainly due to more recent traffic forecasts, used for this review, being more conservative than those used for the preparation of the Financial Comparator. Taking account of this review, the FC costs would be approximately €173-198m higher than the PPP option. The decision to procure the scheme as a PPP represented value for money for the Exchequer and was the appropriate decision for the scheme.

Important Notice

This report has been prepared by AECOM Limited. It is based on information and explanations provided by the National Roads Authority and has been prepared for the sole use of the National Roads Authority.

This Post Project Review report contains certain information of a commercially sensitive nature and should be kept confidential. This report contains information relating to tenderer's pricing and contains information on the Public Sector Benchmark. The PPP Guidelines (Technical Note on the compilation of a Public Sector Benchmark for a Public Private Partnership Project¹) published by the Department of Public Expenditure and Reform require public bodies to keep information relating to the Public Sector Benchmark confidential. This PPR report contains information relevant to the State's approach to evaluation of value for money in PPP competitions that the State may adopt in its future PPP competitions. Release of certain information contained in the Post Project review Report, whether on foot of freedom of information request or otherwise, would likely impact negatively on the State's commercial interests and would accordingly, not be in the public interest. In the event that you receive any request to disclose any information contained in the Post Project review report (whether pursuant to freedom of information legislation or otherwise), we would ask you to notify the National Roads Authority of this request prior to any disclosure being made so that our comments may be taken into account in any decision that might be taken in this regard.

¹ Appendix C contains an extract from the Technical Note on the compilation of a Public Sector Benchmark for a Public Private Partnership Project which outlines current policy relating to disclosure of the Public Sector Benchmark.

Dundalk Western Bypass

Post Project Review

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Appendix A: Overview of PPP Guidance

Appendix B: Review of Components of Financial Comparator

Appendix C: Technical Note on Public Sector Benchmark

1. Introduction

1.1. The Scheme

The Dundalk Western Bypass PPP Scheme forms part of the strategic north-south route corridor entitled Euroroute E01 which links Belfast and Dublin and provides access to the main commercial seaports and airports in the country.

In February 2004 the scheme was procured as a toll concession Public Private Partnership (PPP) Project. The PPP Contract incorporated:

- The Dundalk Western Bypass, a new 11km section of motorway from Ballymascanlan to Haynestown incorporating approximately 7km of new link roads and 13 no. bridges;
- the operation and maintenance of approximately 42km of the existing M1 motorway from Haynestown to Gormanstown;
- an upgrade of the toll plazas to facilitate electronic toll collection; and
- ensuring the full 53km of road meets handback conditions, in order to provide a satisfactory residual life after the end of the 30 year concession period

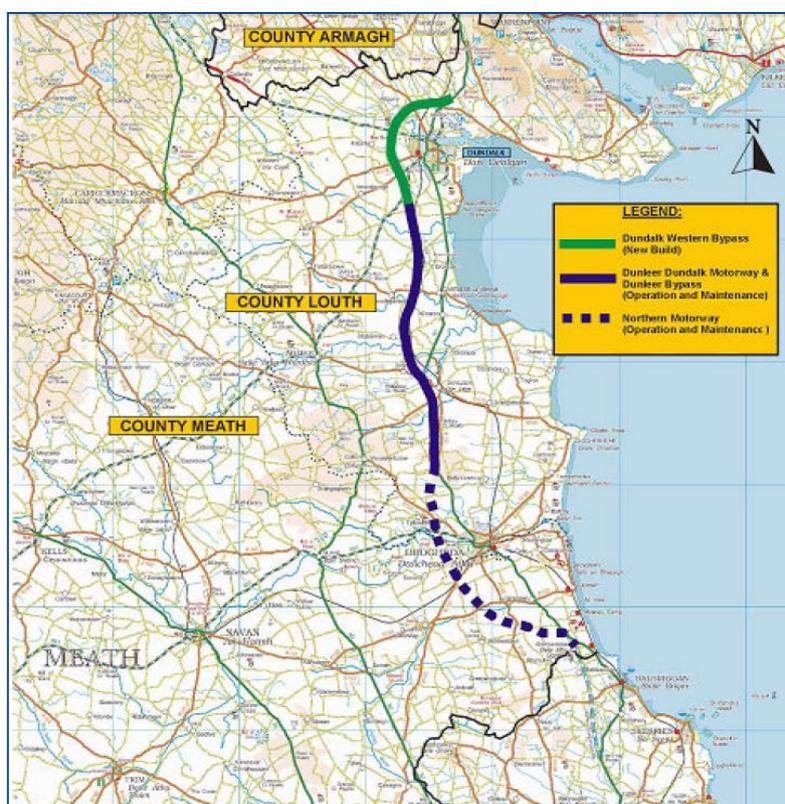


Figure 1.1 Map of Dundalk Western Bypass Scheme

The contract was carried out as a design, build, finance and operate contract. This incorporated the design, construction, operation and financing of the Dundalk Western Bypass and associated works. In addition, the operation and financing of the existing 42km section of the M1 including the tolling facilities was included. The contract has a long term concession period of 30 years from the date of contract award.

The contract was awarded in February 2004 to the Celtic Roads Group Consortium and the Dundalk Western Bypass was opened in September 2005.

This report comprises a Post Project Review of the Dundalk Western Bypass PPP Scheme.

1.2. Guidelines for Post-Project Review

Post Project Reviews are typically carried out a few years after the opening of a scheme. This allows the reviewer to make an initial assessment of the performance of the scheme.

The current standards for Post Project Reviews (PPR) of capital infrastructure projects are those set out in the '*Public Spending Code*' issued by the Department of Public Expenditure and Reform (DPER). This Code specifies that the aim of such a PPR is to determine whether:

- The basis on which a project was undertaken proved correct;
- The expected benefits and outcomes materialised;
- The planned outcomes were the appropriate responses to actual public needs;
- The appraisal and management procedures adopted were satisfactory; and,
- Whether conclusions can be drawn which are applicable to other projects, to the ongoing use of assets, or to associated policies.

Since the early 2000s successive guidance documents have been published by various Government departments which set out the recommended steps that should be undertaken when implementing PPP projects in Ireland to ensure better Value for Money for the Exchequer.

The available guidance at the time includes interim guidelines published by the Department of Finance² and a policy framework by the Department of environment Heritage and Local Government³. Both of these were published in 2003 at which point planning for the Dundalk Western Bypass PPP Scheme was well advanced. An overview of PPP guidance is provided in Appendix A.

The PPP guidance that was in place at the time the Dundalk Western Bypass Scheme was being planned was not as comprehensive as the current guidelines and, most notably, was not specific to road schemes.

The available guidance allowed the identification of some of the key areas that should be covered when completing Post Project Reviews of PPP Schemes, including

- Reviewing the PPP planning steps;
- Reviewing the PPP procurement decision; and
- Reviewing the PPP scheme implementation.

Similarly the NRA's project appraisal guidance has evolved through the years with the NRA's Project Appraisal Guidelines (first published in 2008⁴) determining the current recommended process to be followed.

On the basis of the overview of the guidance above, a two part approach to this Post Project Review was adopted. In the first instance, a value for money review of the scheme itself was undertaken, identifying the established project need, whether the project design process was properly planned, and whether the project is delivering benefits in excess of costs.

The second part of this Post Project Review (PPR) comprises a value for money review of the decision to procure the scheme as a PPP. This includes a review of the PPP pre-planning steps undertaken, a review of the PPP procurement decision, and a review of the PPP scheme implementation to date in terms of expected outcomes.

² Interim Guidelines for the Provision of Infrastructure and Capital Investments through Public Private Partnerships – Department of Finance, July 2003

³ Policy Framework for Public Private Partnership (PPP) in Ireland – Department of the Environment Heritage and Local Government, November 2003. Note: Appendix 1 of the framework document provides a detail of the key documents in the PPP area prior to 2003

⁴ The Project Appraisal Guidelines were first published in 2008 and have developed incrementally from that point

1.3. Layout of the Report

The broad structure of PPR is as follows: Section 2 outlines a traditional Post Project Review of the Dundalk Western Bypass as a scheme. This is in line with the NRA *Project Appraisal Guidelines* (PAG), the DPER *Public Spending Code* and the Department of Transport's '*Guidelines on a Common Appraisal Framework for Transport Projects and Programmes*', 2009.

Sections 3-5 focus on a review of the procurement of the scheme as a Public Private Partnership (PPP). Section 3 reviews the pre planning steps carried out by the NRA prior to procuring the scheme as a PPP. Section 4 reviews the basis of the decision to procure the scheme as a PPP, while Section 5 is concerned with the PPP project outturn relative to the outturn anticipated.

Finally Section 6 presents a summary of the PPR findings and recommendations.

2. Scheme Review

2.1. Introduction

As identified in Section 1, the '*Public Spending Code*' identifies a number of questions that need to be answered as part of a Post Project Review of a scheme. The approach taken here to address the requirements of the Code is to identify key stages in the scheme development and the key questions regarding each stage that address the requirements set out in the Code, as follows⁵:

- Scheme Conception
- Scheme Planning
- Scheme Implementation
- Scheme Operational Performance

2.2. Scheme Conception

2.2.1. Background

The Dundalk Western Bypass PPP Scheme was procured as a Public Private Partnership incorporating the design and construction of a new 11km section of motorway and the operation of a 42km section of the existing M1 motorway as outlined in Section 1.1. Part of the new 11km motorway provision in the scheme was originally part of the Dunleer/Dundalk Motorway Project.

The scheme was developed as a PPP scheme on the basis that a PPP could deliver

- (i) value for money when compared to traditional procurement;
- (ii) facilitate the injection of private finance and accelerate the delivery of the national road improvement schemes to reduce Ireland's infrastructural deficit; and
- (iii) ensure a high quality route that would offer a greatly improved service for users of the then existing N1, that would be capable of accommodating significant traffic volumes.

Construction of the Dunleer/Dundalk Motorway Scheme from Dunleer to the Southern Link Interchange at Haynestown was completed in 2001. Owing to a shortage of funding, construction of the scheme was ceased at that point. The remaining 7 km scheme was incorporated into the Dundalk Western Bypass scheme. The final 4km section of the Dundalk Western Bypass scheme consisted of the extension of the motorway from the Armagh Road Interchange to the N1 near Thistle Cross. This section was referred to as the Dundalk Western Bypass – Northern Link.

Construction of the Dundalk Western Bypass motorway scheme commenced in February 2004. The opening of the scheme in 2005 enabled motorists to travel on continuous motorway between Dublin and the N1 north of Dundalk.

2.2.2. Need and Objectives

The need to develop the N1 National Primary Road and bypass Dundalk was recognised as early as 1979 and remained an objective of a number of subsequent Government infrastructure strategies and local plans. The following documents refer to the need for an upgrade of the route:

- 'Road Development Plan for the 1980's', 1979 & 1985;
- 'Operational Programme on Peripherality – Roads and other Transport Infrastructure', 1990;
- 'National Roads Need Study', 1998;
- 'National Development Plan 2000 – 2006'; and
- Dundalk Transportation Study

⁵ A more detailed summary of the relevant stages and key questions are set out in Appendix 1.

In 1990, the traffic flow on the N1 to the south of Dundalk was 12,600 AADT. The estimated capacity on the road at the time was 13,500 AADT at level of service D. The prevailing traffic volumes indicated that the level of service on the route had begun to deteriorate to levels below the standards desirable for a National Primary Route. The level of usage of the road by HGVs was relatively high, averaging 23 per cent to the north of Dundalk and 29 per cent along the Inner Relief Road. In addition, for each year between 1983 and 1993 County Louth had the worst accident record in the country with accident rates over twice the national average.

The objectives associated with the development of the Dundalk Western Bypass Scheme were:

- to provide for the efficient and safer movement of traffic between the existing Dunleer/Dundalk Motorway and the N1 north of Dundalk;
- To reduce congestion in the centre of Dundalk town and reduce journey times by providing an effective bypass of the town;
- To reduce transport costs and improve access to ports and airports;

The general objective associated with the Dundalk Western Bypass was to overcome the inadequacies associated with the existing road network by facilitating long distance national and international traffic as well as the longer journeys of traffic generated locally.

2.3. Scheme Planning

2.3.1. Current NRA Project Management and Appraisal Guidance

The present day guidelines were not in place at the time the Dundalk Western Bypass was being developed. Indeed, the experience of this and other similar schemes is likely to have been an input to the development of the current guidelines. Nonetheless it is useful to examine the present day guidance.

As part of the NRA's current Project Management Guidelines (2010) and Project Appraisal Guidelines (2008 onwards) there are a number of recommended steps involved in the planning of a new road development. These are summarised in Table 2.1.

Table 2.1: Summary of Key Deliverables as per Current Guidance

Phase	Project Management Guidelines Deliverables	Project Appraisal Guidelines Deliverables
2 – Route Selection	Public Consultations Route Selection Report Variation to County Development Plan Public display (preferred route)	Traffic Modelling Report Cost Benefit Analysis Updated Project Brief Preliminary Business Case Project Appraisal Balance Sheet
3 - Design	Design Report	Revised Traffic Modelling Report CBA (using Target Cost and Total Scheme Budget)
4 – Statutory Processes	EIS/CPO documents	Revised Traffic Modelling Report CBA (using Target Cost and Total Scheme Budget) Updated Project Brief Revised Project Appraisal Balance Sheet Business Case
5 – Tender & award	Tender Documents Tender Report	Updated Traffic Modelling Report Updated Cost Benefit Analysis Updated Project Brief Updated Project Appraisal Balance Sheet Final Business Case

Source: NRA Project Management Guidelines 2010

2.3.2. *Guidance in Place at Scheme Preliminary Design Stage*

Both the 2010 Project Management Guidelines and the 2008 Project Appraisal Guidance were put in place by the NRA post the implementation of the scheme. Some elements of the scheme also predated the NRA's 2000 Project Management Guidelines and the DOT 2004 published '*Parameter Values for Use in Cost-Benefit Analysis of Transport Projects*'.

The main source of appraisal guidance in place at the time of the implementation of the scheme was the UK Design Manual for Roads and Bridges (DMRB) and the UK Treasury Taskforce policy statements and technical notes⁶. In addition, the National Roads Needs Study (1998), included forecast traffic growth on the national road network in Ireland over the period to 2019.

2.3.3. *Traffic Analysis and Forecasting*

Dunleer Dundalk Motorway Project

A traffic analysis was carried out in 1990 for the Dunleer Dundalk Motorway Project which ultimately became incorporated into the Dundalk Western Bypass scheme. The base year for the traffic analysis was 1992, the year of opening was 1999 and the design year 2019. In 1992, it was forecast that 12,300 AADT would divert from existing roads onto the motorway. It was forecast that approximately 21,790 AADT would divert onto the newly developed motorway in 2012.

Dundalk Western Bypass - Northern Link

Traffic analysis was subsequently carried out for the 4km Dundalk Western Bypass - Northern Link in 1999/2000. The traffic analysis for the Northern Link used the original traffic analysis completed in 1990 for the Dunleer/Dundalk Motorway Project to establish the principal traffic movements and patterns. Additional traffic surveys were carried out to update the models to a base year of 1999.

The modelled opening year of the scheme was 2004 and the design year 2019. The estimated traffic predicted by the modelling are shown in Table 2.3.

Dundalk Western Bypass PPP Scheme

The Dundalk Western Bypass scheme was subsequently reviewed for its potential as a Public Private Partnership (PPP) motorway scheme. A traffic analysis study was completed in 2001, taking into account the effect of tolling on the M1 motorway. As part of the traffic analysis a SATURN model was developed to model traffic movements in the area stretching from the M50 to the north of Dundalk. The base year modelled was 1998, with a 2027 design year. Two traffic growth rates were modelled as follows:

- (1) a low growth scenario which was broadly based on the rate of growth set out in the National Roads Needs Study, and
- (2) a high growth scenario, which was based on observed traffic growth in the corridor between 1993 – 1998.

The development of the SATURN model and subsequent 2001 traffic report is well produced and consistent with the standards available at the time of the study. However, the analysis was lacking central traffic forecasts, and the five year trend period upon which the high growth traffic growth scenario was based is considered a short period upon which to base long term traffic growth.

⁶ UK Treasury Taskforce "Policy Statement No. 2 – Public Sector Comparators and Value for Money" and "Technical Note No. 5 – How to Prepare a Public Sector Comparator"

Tables 2.2 and 2.3 summarise the scheme traffic growth assumptions and traffic forecasts respectively.

Table 2.2: Forecast Traffic Growth Rates

Period	Low Growth	High Growth
1998-2000	6.2	6.2
2000-2005	5	5
2005-2012	2	4
2012-2019	2	3
2019-2027	2	2

Source: Toll / PPP Study for the Dundalk Western By-pass / Boyne Bridge Scheme

Table 2.3: Forecast Daily Traffic Flows on Dundalk Western Bypass

Location	AADT		
	2012	2019	2027
M1 Dundalk Western Bypass	21,790	30,687	40,860*

* High growth scenario

2.3.4. Route Selection and Preliminary Design

As previously set out, the Dundalk Western Bypass scheme comprised two sections - the part of the Dunleer/Dundalk Motorway Scheme between Haynestown and the Armagh Road Interchange (7km), and the Dundalk Western Bypass - Northern Link (4km).

The chosen route for the Haynestown – Armagh Road Interchange section was determined by Louth County Council as early as the 1970s, and was incorporated into the 1975 County Louth Development Plan. The route selection process was not revisited for the 7 km of the Dundalk Western Bypass which was originally part of the Dunleer/Dundalk Motorway Scheme.

As part of the preliminary design phase for the Dundalk Western Bypass - Northern Link Section, six route options were considered. The options were assessed using the standard appraisal framework taking account of Traffic, Engineering, Environmental and Financial impacts. Having determined a preferred route (Route 1 Option A), it was subsequently compared to the Do Minimum scenario. Route 1 Option A was preferred over the Do Minimum scenario as it was considered that the single carriage option (as represented by the Do Minimum scenario) had insufficient capacity for the projected traffic on the route.

A project appraisal was not carried out at route selection stage.

2.3.5. Project Appraisal

Dunleer Dundalk Motorway Project

A spreadsheet based cost benefit analysis of the overall Dunleer/Dundalk Motorway Project was carried out in 1993 to determine its Internal Rate of Return (IRR). The assessment covered an eight year design and construction period (1992 – 1999) and the twenty year lifetime of the project (2000 – 2019). The estimated capital costs of designing and constructing the entire Dunleer/Dundalk Motorway Project was estimated to total £75.7m (€96.1m)⁷. The total estimated costs were set

⁷ Source: Dunleer – Dundalk Motorway Project Environmental Impact Study – Report Number 4 Cost Benefit Analysis (Louth County Council, 1993)

against the forecast benefits including savings in time, reduction in accidents and savings in fuel consumption.

A spreadsheet model designed by Louth County Council was used to calculate an IRR of 11.13%. A sensitivity analysis was carried out to determine the IRR with more conservative assumptions on capital costs, traffic growth rates, and rates of GDP growth. The results of the sensitivity tests revealed a lower IRR of 8%.

The 1993 cost benefit was completed prior to publication of both the National Roads Needs Study and/or both NRA and Department of Transport Guidance on standard parameter values to be used in project appraisal.

Dundalk Western Bypass PPP Scheme

In 1999, a decision was taken to review the possibility of procuring the Dundalk Western Bypass Scheme as a Public Private Partnership (PPP). The scheme differed in its composition to the €96m Dunleer/Dundalk Motorway Project as outlined in Sections 1.1 and 2.2.

At the time of the procurement of the PPP scheme, the then existing NRA Project Management Guidelines (2000) did not require the economic appraisal to be revisited at Tender / Contract Award Stage. Although revised Exchequer cost estimates associated with the scheme were prepared, and revised estimates of road patronage were forecast taking account of the tolling of the motorway, a revised economic appraisal was not carried out at this point.

2.3.6. Compliance with Procurement, EIS and other Statutory Requirements

An Environmental Impact Statement (EIS) was prepared for the Dunleer/Dundalk Motorway Project (which encompassed what became subsequently the Dundalk Western Bypass) in 1993.

Procurement of the Dundalk Western Bypass was via a Public Private Partnership PPP arrangement advertised in the OJEC in July 2001. The preferred tender was selected in October 2003 and the contract signed in February 2004, following a delay due to legal challenges by affected landowners, which were ultimately dismissed by the High Court in March 2003.

All of the above processes satisfied the statutory procedures at the time.

2.3.7. Adequacy of Consultation Processes

During the preliminary design phases of both the Dunleer Dundalk Motorway Project and the Dundalk Western Bypass – Northern Link significant public and stakeholder consultation was held in summer 1990 and March 1999 respectively.

2.4. Scheme Implementation

2.4.1. Scheme Management Structures

The preliminary design of the Scheme was carried out in accordance with the Design Manual for Roads and Bridges applicable at that time.

2.4.2. Scheme Schedule, Management and Costs

The Dundalk Western Bypass Scheme was procured as a PPP. The Scheme implementation in terms of the delivery of the Scheme to the specification as set out in the PPP Contract, the management of the PPP Contract, the budget schedule, and the budget outturn are explored in detail in Section 5, where the performance of the Scheme is reviewed in terms of anticipated outcomes.

2.5. Scheme Operational Performance

2.5.1. Traffic Outcomes on the New Road

The primary objective of the Dundalk Western Bypass Scheme was to provide a bypass around Dundalk town, thereby providing relief to the traffic congestion that was occurring in the town. Since the opening of the Bypass, anecdotal evidence has suggested there has been a significant reduction in the volumes of traffic in Dundalk town and hence a reduction in overall traffic congestion.

This is confirmed by available traffic counter data for the M1 Dundalk Western Bypass and the N52 Dundalk Inner Relief Road, as set out in Table 2.4.

Table 2.4: Actual Traffic Volumes in Dundalk Area, 2004, 2007 and 2013

Location	2004		2007		2013	
	AADT	%HGV	AADT	%HGV	AADT	%HGV
M1 Dundalk Western Bypass	-	-	19,504	16.9	26,225	14.6
N52 - North of Dundalk	21,137	13.4	11,230	6.4	11,331	2.7
N52 - South of Dundalk	22,396	12.8	11,227	5.9	11,222	3.5

It is clear from the data that the Dundalk Western Bypass has resulted in significant relief to traffic congestion in Dundalk with daily traffic flow reductions of the order of 47% on the N52 Dundalk Inner Relief Road. The proportion of heavy goods vehicles on the N52 has reduced from 15% to 3-4%.

Actual traffic volumes on the scheme in 2013 are higher than those predicted for 2012 in the Scheme Planning stage. An analysis of the actual usage of the tolled motorway compared to forecast usage levels is set out in Section 5.4.

2.5.2. Road Safety Outcomes

One of the objectives associated with the Dundalk Western Bypass Scheme was the provision of a safer route option to users of the motorway. Research has indicated that, historically, motorways have proved to be seven times safer than two lane roads in general and three times safer than dual carriageways⁸.

In the period since the Dundalk Western Bypass Scheme opened in 2005 and end 2011, three fatal collisions occurred on the 54km stretch of motorway. This is equivalent to a fatal collision rate of approximately 0.085 per 100m vehicle kilometres. The research, to which reference was made above, indicated that in the period 1996-2000, Irish motorways achieved a fatal collision rate of 0.19 per 100 m vehicle kilometres as opposed to 1.36 per 100m vehicle kilometres on two lane roads. The Dundalk Western Bypass Scheme is thus achieving accident rates of half the general motorway rate.

Since that period 1996-2000, fatal collisions generally have declined by some 40 per cent. Allowing for this reduced collision risk, it is clear that the Dundalk Western Bypass Scheme is providing safety benefits at least in line with the better safety record associated with motorways.

2.5.3. Overall Economic Return to the State

The Dundalk Western Bypass PPP Scheme will deliver overall value for money for the State based on the following:

⁸ See: D O'Conneide at al. Inter-urban Accident Rates by Road Type and Geometric Elements. Association of European Transport, 2004.

- Traffic volumes on the scheme have more than met expectations to date. This suggests that users value highly the benefits of the bypass and have not been deterred by the tolls to any significant extent;
- Non-users of the scheme have benefited significantly from reduced congestion, particularly in the Dundalk urban area;
- The high traffic volumes using the scheme and the low fatal collision rate suggests that the safety benefits associated with motorways are being achieved.

2.6. Summary

The primary objective of the Dundalk Western Bypass Scheme was to provide a bypass around Dundalk town, thereby providing relief to the traffic congestion that was occurring in the town. Since the opening of the bypass, large volumes of traffic have used the bypass, and it has contributed to a significant reduction in the volumes of traffic in Dundalk town and a reduction in overall traffic congestion. To date, the safety record of the bypass indicates that it is delivering the safety benefits associated with motorways in general.

With some exceptions, the scheme was successfully planned and implemented. The preliminary design of the scheme was carried out in accordance with the Design Manual for Roads and Bridges applicable at that time.

However, there is a concern regarding the project appraisal process. In the first instance, it was carried out over ten years prior to the scheme's construction. The CBA was not revisited prior to contract award, when revised cost estimates and traffic forecasts associated with a PPP procurement of the Scheme were available. A revised CBA at the tendering stage now forms part of the NRA's Project Appraisal Guidelines, which addresses this shortcoming for all current/future schemes.

3. PPP Pre-Planning Review

3.1. Introduction

This section reviews the pre-planning steps completed by the NRA in progressing the Dundalk Western Bypass Scheme as a PPP.

3.2. Background

A PPP is a partnership between the public and the private sector for the purpose of delivering a project. There is a sharing of project risks between the public and private sectors. A PPP project benefits from an accelerated implementation through the availability of private sector funding. This is particularly the case in situations of limited public finances, where access to private sources of funding allows the progression of projects that would not otherwise be possible.

A number of guidance documents have been published by the authorities with responsibility for implementing PPPs, since the first PPPs were procured in Ireland over ten years ago. A summary of some of the key PPP guidance documents is provided in Appendix A. There are a number of planning steps recommended when considering a Scheme as a potential PPP.

3.3. PPP Scheme Selection

The *National Development Plan (NDP), 2000 - 2006* included an objective for the concentration of investment on the five strategic national roads linking the main urban areas in the country, one of which was the N1 from Dublin to Belfast. The NDP confirmed the policy for PPPs on being the maximum usage of PPP consistent with the principles of efficiency and best value for money. Minimum targets for PPP private funding were included in the NDP, including 23% of the total €5.97 billion 2000 – 2006 road investment programme.

In mid-1999 the Government requested that the NRA examine a number of schemes, including a planned 11km length of motorway on the N1 route, to assess their potential as PPP schemes. The Dundalk Western Bypass Scheme was announced as part of the NRA's Tranche II PPP roads programme in June 2000.

The NRA established certain key principles to guide its PPP road scheme selection analysis. These principles were as follows:

- The use of the PPP mechanism would not delay scheme delivery;
- An alternative toll-free route should be available for road users;
- Tolloed roads should be spread across the main national routes to create an equitable distribution of user-charging on the country's newly constructed road network;
- A road project needed to be a minimum of £30 million (€38m.) in value in order to produce value for money when using the PPP process; and
- A public subsidy would be considered for high cost schemes which could not be solely financed from tolls.

When examined in terms of these principles, the NRA determined that the Dundalk Western Bypass met the criteria as a potential PPP Scheme.

3.4. Assessment of Shadow Bid Model

Prior to the commencement of the PPP tender process a Shadow Bid Model (SBM) was developed by the financial advisors (KPMG). The SBM included the following input information:

- Projected traffic and toll level information provided by the NRA's traffic advisors;
- Scheme costs provided by NRA and/or its technical advisers (Babtie Group); and

- Financing assumptions in relation to debt, equity and economic assumptions.

The SBM was used to run a variety of financial scenarios which illustrated (or 'shadowed') how a private sector bidder might approach the DWB PPP scheme. The Shadow Bid Model is used to inform decisions in relation to the structuring of the transaction to be provided for in the tender requirement. An overview of certain financial related tendering requirements as provided for in the Dundalk Western Bypass tender invitation documents are set out in the table below.

Key Features of Dundalk Western Bypass PPP Scheme Tender Requirements

- The PPP Company would be responsible for taking over the current tolling facilities and collecting tolls along the motorway three months after the Contract sign date. The PPP Company would pay a minimum of 55% of all toll revenue collected back to the NRA in the form of a royalty fee;
- Tenderers were required to share excess revenue with the NRA though a percentage of traffic revenue at different traffic levels.
- To the extent that Tenderers required construction payments, the cumulative construction payments could not exceed €60m (ex VAT) or 40% of the cumulative construction costs;
- To the extent that Tenderers required operational payments, the average operational payment over contract period could not be greater than €4m per annum; and could not exceed the Authority affordability limits of €5m per annum in each of the first five Contract Years after the Target Completion Date and would not exceed €10m per annum in each Contract Year thereafter.

The PPP planning guidance states that the decision to procure a project as a PPP should be based on a VFM assessment. This assessment compared the costs of procuring the scheme by traditional means (the Financial Comparator) with the equivalent costs of procuring the scheme by means of a PPP.

VFM comparisons were undertaken at various stages in order to ensure the continuing rationale for procuring the Scheme through a PPP option. These stages are as follows:

- Prior to receipt of Invitation to Negotiate (ITN) Tenders;
- Following receipt of ITN Tenders; and
- Following the receipt of Best and Final Offers (BAFO).

A financial comparator was prepared as part of the Value for Money Assessment of the Dundalk Western Bypass Scheme, which identified the costs of procuring the scheme using a traditional procurement approach.

3.6. Preparation of the Financial Comparator

The Financial Comparator (FC) consists of an assessment of the total costs that would be incurred in the provision of a scheme through a traditional procurement scenario in which the public sector retains managerial responsibility and exposure to risk. In preparing the FC for the Dundalk Western Bypass Scheme, DOEHLG and UK Treasury guidance was used, as was the experience in preparing previous Financial Comparators by the NRA's specialist advisors i.e. technical (Babtie Group) and financial (KPMG).

As per the Guidance, the costs included in the FC were as follows:

- Base costs: the public sector's estimate of the costs it would incur to construct, maintain and manage the infrastructure to the duration and specification of the contract, before allowing for contingencies or risks.
- Retained risks: these risks, by their nature, always rest with the public sector;

- Risk retained under traditional procurement, but transferred under PPP: an allowance for the additional costs to the public sector as a consequence of the risks associated with the project.
- Efficiency adjustments: allows for the public sector improving its performance in managing base costs and the impact of risks over the life of the project.

As per the guidance, the FC was prepared prior to the receipt of ITN Tenders, to ensure it represented the NRA's best estimate of the cost of delivering the services required under the PPP scheme without being influenced by knowledge of the private sector's actual proposals⁹.

3.7. Risk Assessment

In preparing the FC the risks capable of being quantified, that differed between the public and private sectors were assessed.

In deciding the risk adjustment to apply to the base costs comprising the FC, risk workshops were held over the period October 2001 - August 2003. The workshops were attended by key stakeholders including the NRA, their advisers, and the relevant Local Authorities.

A risk register was developed in which the allocation of the risk costs under a PPP arrangement was identified (i.e. proportion attributed to public sector; private sector; or shared). A formal post risk review workshop was held where the Dundalk workshop results were compared to those identified for the Kinnegad-Kilcock and Waterford Schemes.

Risks not amenable to quantification, but with the potential to influence the VFM assessment, were identified separately as part of the VFM assessment.

3.8. Identification of Non Monetary Costs and Benefits

Costs and benefits associated with each procurement option which were not amenable to quantification were also included in the VFM assessment. In order to identify the non-monetary costs and benefits associated with the PPP option, a separate workshop was held with the relevant stakeholders.

3.9. PPP Procurement Steps

Public Private Partnerships are a form of procurement and as such are subject to all the normal discipline applying to procurement generally, including Department of Finance procurement guidelines as well as EU Procurement Directives.

The procurement of the PPP Scheme was conducted in an open and transparent manner, and in line with the relevant EU and national regulations.

3.10. Summary

The planning steps implemented by the NRA prior to procuring the Dundalk Western Bypass Scheme as a PPP were reviewed in line with the official PPP implementation guidance. The relevant steps advocated in the guidance documents were implemented by the NRA.

As set out in Section 2, the steps above would have been enhanced by the completion of a revised economic appraisal at the tendering stage. This would ensure explicit consideration would be given to updated cost/traffic projections relating to the scheme. As noted in Section 2, a revised CBA at the tendering stage now forms part of the NRA's Project Appraisal Guidelines, which addresses this shortcoming for all current/future schemes.

⁹ Two Financial Comparator scenarios were modelled, one with public sector tolling and one without tolling

4. PPP Procurement Review

4.1. Introduction

This section includes a review of the VFM assessment undertaken to determine if the basis on which the decision was taken to procure the scheme as a PPP was appropriate.

4.2. Outcome of VFM Assessment

The VFM Assessment compared, over the lifetime of the concession project (30 years), the Net Present Value (NPV) of the Exchequer cash flows associated with the traditional procurement scenario, with the NPV of the Exchequer cash flows associated with the PPP procurement scenario.

Table 4.1 sets out, in summary format, the NPV of the NRA and Exchequer costs and revenues associated with both procurement options *at BAFO* (as per the successful concessionaire).

Table 4.1: Summary of Exchequer Costs (including VAT*) of the scheme at BAFO (2003 Prices)

Financial Comparator (Traditional Procurement – with tolling)	NPV 000 €	PPP Option Preferred Tenderer	NPV 000 €
Base Costs	256,252	Construction payments	0
Toll Costs	82,010	Operational payments	0
Toll Revenue	(348,614)	Revenue Share	(7,099)
		Royalty Fee	(18,292)
Project risks retained (costs)	61,219	Risks retained in PPP and FC	3,258
Less Revenue from lane occupation charges	(452)	Less Revenue from lane occupation charges	(412)
		Less Revenue from Non Availability Charges	(675)
Total risk adjusted cost to NRA (before Revenue Risk)	50,415		
Project risks (Revenue)	86,635		
Total Risk adjusted cost to NRA	137,050*	Total Risk adjusted cost to NRA**	(23,220)*
Less incremental cash flows to the Exchequer	(60383)	Less incremental cash flows to the Exchequer	(11,496)
Risk adjusted cost to Public Sector	76,667	Risk adjusted cost to Public Sector	(34,716)

Source: Dundalk Western Bypass BAFO Evaluation Oct 2003

* Both cost totals were subsequently adjusted to take account of the tax implications (i.e. VAT etc.) associated with each procurement option

As set out in the Table, there were estimated net benefits associated with the PPP option, totalling (€23m), compared to an estimated cost of traditional procurement totalling €137m¹⁰.

The higher estimated public sector costs associated with the (tolled) Financial Comparator option relative to the PPP option resulted in the decision being taken to procure the Scheme as a PPP.

Weighted average traffic forecasts were used as part of the VFM assessment to determine the toll revenue attributable to the NRA from the Scheme in the case of the FC. Since the opening of the Dundalk Western Bypass the traffic levels using the M1 Motorway have exceeded the levels forecast. However, because of the relatively high rate of traffic growth that was forecast over the entire concession period, which is now considered unlikely to materialise in the longer term, the differential between the forecast and actual traffic volumes is likely to decline over time.

On the basis of the traffic levels that have materialised to date, and estimated future traffic growth levels as set out in the NRA's Project Appraisal Guidance, it is estimated that toll revenue from the Scheme under the traditional procurement scenario, where the State would have retained responsibility for tolling the Motorway, would likely total between €310 and €335 million (NPV - non risk adjusted total) over the life of the concession. This value can be compared to the €348m NPV estimated in the VFM assessment.

4.3. Review of Components of Financial Comparator

A detailed review was undertaken to determine if the individual cost and revenue items included in the Financial Comparator and PPP options represent accurate approximations of the costs and revenues attributable to the Exchequer under each procurement option. Full details of this review are included in Appendix B which can be summarised as follows:

- The whole life costs in the Financial Comparator were circa €60m higher than those estimated by the average ITN Tenderers;
- The risk values associated with the FC scenario revealed that the cost risk values of €61m (21% of total costs) are broadly acceptable; and
- Toll revenue from the scheme under the traditional procurement scenario would likely total €310-€335m over the life of the concession compared to the €348m estimated in the VFM assessment.

4.4. Summary

The NRA's decision to procure the Dundalk Western Bypass Scheme as a PPP was based on a VFM Assessment. The results of the VFM assessment showed there were higher NRA costs to the order of €160m associated with the Financial Comparator relative to the PPP option, which resulted in the decision being taken to procure the Scheme as a PPP.

Following a detailed review of the components of the VFM assessment, it was determined that the net cost of the Financial Comparator was potentially overestimated by the order of €13-38m. This is mainly due to more recent traffic forecasts, used for this review, being more conservative than those used for the preparation of the Financial Comparator. Taking account of this review, the FC costs would still remain approximately €122-147m higher than the PPP option. The decision to procure the scheme as a PPP represented value for money for the Exchequer and was the appropriate decision for the scheme.

¹⁰ As previously indicated, owing to the uncertainty surrounding whether the motorway would be tolled in the event that the public sector undertook its construction and operation, a non-tolled Financial Comparator option was also modelled as part of the VFM Assessment. The non-tolled FC option represented a greater net cost to the NRA as no toll revenues were attributable to the Exchequer under this option. Owing to the fact that the differential between the Exchequer costs associated with the FC and PPP options was lower for the tolled FC scenario, the remainder of this Section is restricted to reviewing the tolled Financial Comparator scenario.

5. PPP Scheme Implementation Review

5.1. Introduction

This section reviews the implementation of the Dundalk Western Bypass Scheme to date. The scheme's implementation is reviewed across three key criteria, as follows:

- **Timing:** A review of the time taken to complete the various stages of the scheme
- **Quality:** An analysis of whether the key elements of the scheme as per the project specification were achieved; and
- **Costs and Revenues/Traffic Volumes:** an analysis of the public sector costs associated with PPP Scheme relative to initial estimates.

5.2. Timing of PPP Scheme Implementation

As part of its 2000 Best Practice Guidelines, the Department of the Taoiseach (DOT) stated that a PPP approach should be adopted wherever it would “*accelerate the implementation of a particular project*”. In the Framework for Public Private Partnerships - Working Together for Quality Public Service, published by the Social Partners in 2000, the principles underpinning the PPP programme were set out, including: “*PPPs should maximise the benefits of private sector efficiency, expertise, flexibility and innovation*”.

Tables 5.1 and 5.2 set out the procurement and construction periods associated with the Dundalk Bypass PPP Scheme.

Table 5.1: Procurement Timelines

Date	Task
Pre Qualification	
July 2001	Notice dispatched to OJEC
July 2001	OJEC Notice
ITN Tender Phase	
February 2002	Tender Invitation Documents issued
July 2002	Submission of Tenders for shortlisting
BAFO Tender Phase	
August 2003	BAFO Invitation
September 2003	Receipt of BAFO Submissions
February 2004	Contract Award
Road Opening	
September 2005	Road Opening

Source: NRA

Table 5.2: Dundalk Bypass PPP Scheme Timelines

	No of Months
Start Procurement - end Procurement	32
Start Construction - end Construction	19
Start Procurement - end Construction	51

The procurement period, from date of first issue of the OJEC notice to contract award to the successful PPP bidder, totalled 32 months. A challenge on statutory procedures seeking a judicial review of the EIS caused a six month delay to the issuing of BAFO invitation documents. The PPP contract was awarded to the successful bidder in February 2004. The motorway Scheme was opened 19 months later, in September 2005.

It was not possible to identify equivalent procurement and construction timeframes for roads of a similar scale to the Dundalk scheme¹¹. As such, the review of the scheme's timeliness is restricted to a review of the targets set for the scheme. The motorway scheme was scheduled to be complete in February 2006. The actual motorway opening took place in September 2005, five months ahead of schedule.

5.3. Quality of PPP Scheme Implementation

In reviewing the PPP Scheme's implementation, a number of key areas were reviewed:

- the delivery of the scheme to the specification of the PPP contract;
- the management procedures put in place by the NRA; and
- the contract management in the design, construction and operational phases.

5.3.1. Delivery of Key Element of the Scheme

The Dundalk Western Bypass was delivered in line with the contract specification. There have been no issues relating to the quality of the scheme post completion that have not been addressed speedily by the concessionaire, in line with the terms of the contract.

5.3.2. PPP Management by the NRA

The progression of the scheme was managed by a newly established PPP unit within the NRA. In line with published guidance, the NRA contracted legal, financial and technical advisers to assist with:

- the devising of an appropriate procurement mechanism;
- the drawing up of detailed contract documents; and
- assessing and selecting PPP consortia for the scheme.

To date, the management of the PPP Scheme contract has run smoothly. The PPP Concessionaire, in line with its obligations, has provided the NRA with its reporting requirements, including: Winter maintenance reports; Annual reports; Annual performance reports; five yearly management plans; and Monthly O&M reports.

5.3.3. Contract Management during Design and Construction

The NRA contracted technical engineers to project manage the design and construction of the scheme on its behalf. Over the course of the construction period, the NRA was provided with a monthly construction period report.

5.3.4. Contract Management during Operation

The NRA's management of the operational phase of the PPP contract has operated on the same basis as the design and construction phase, namely technical support has been contracted in as required. NRA staff members are allocated supervisory roles for individual PPP Schemes. As part of this supervisory role, the NRA staff member is responsible for reviewing the reports provided by the

¹¹ Such a comparison would be possible if the schemes in the PPP programme were compared to a sample of similar non PPP road schemes.

PPP Concessionaire, making on-sites visits to the scheme and administering the contract.

5.4. Outturn Cost of PPP Scheme

One of the key principles underpinning the implementation of PPP infrastructure projects in Ireland is the obtaining of better Value for Money for the NRA and the Exchequer. The Department of Finance PPP Implementation guidance (see Appendix A) stated that Ex-Post Reviews of PPP Schemes should contain a comparison of the actual PPP outturn costs (as provided for in the PPP contract¹²) with the initial estimated costs of the Scheme (as set out in the Financial Comparator).

The actual PPP outturn cost to the Exchequer is identified in the PPP contract and as such, the PPP outturn cost remains unchanged except where:

- any variation costs are potentially introduced after financial close; and/or
- the revenue share/royalty payments payable from the PPP Scheme are different to those estimated in the tender evaluation process.

The estimated NRA costs associated with the preferred PPP option totalled a net benefit of €23m (see Table 4.1).

The net benefit figure can be attributed to the structure of the invitation to tender, where it was a condition of the contract that no revenue share would be payable to the NRA in situations where the aggregate number of vehicles using the motorway was less than 26,500 ADT in the first contract year, increasing at a rate of 1.75% per annum thereafter until the minimum limit of 35,000 ADT was reached. This stipulation ensured the tender bids would not be structured so as to transfer the revenue risk back to the NRA.

Since the signing of the PPP contract with the concessionaire, there have been a small number of variations relating to landscaping, central median barrier installation and signage. These variations were not PPP related in that they would have applied had the scheme been constructed as a Design & Build scheme. The revenue share payments arising from the PPP scheme have exceeded those estimated as part of the tender evaluation process. Actual revenue share payments are determined by traffic levels using the motorway. The extent to which these have differed from estimates used in the VFM assessment process is explored in more detail below.

5.4.1. Traffic Levels

Table 5.3 and Figure 5.1 below set out a comparison of the NRA traffic forecasts used as part of the VFM Assessment process and the actual traffic volumes which have materialised since the opening of the scheme in September 2005.

¹² The actual costs incurred by the PPP Concessionaire in providing the infrastructure and services as per the specification incorporated into PPP contract is unknown, because the Concessionaire is not required to provide this information to the NRA. The outturn cost data that is available relates to the estimated outturn NRA costs associated with the PPP Contract, as signed by the Concessionaire at Financial Close. This cost estimate incorporates any agreed contributions to construction and operational costs payable by the NRA to the Concessionaire less any revenue share/royalty payments payable to the NRA.

Table 5.3: Forecast NRA Weighted Average and Actual Traffic Volumes

Year	Low Forecast	Medium Forecast	High Forecast	Weighted Avg Forecasts	Actual Traffic	% difference (WA & actual)
2003	18,925	19,126	19,761	19,171	17,564	-8.4
2004	19,682	20,082	20,749	20,082	21,897	9.0
2005	20,469	21,086	21,786	21,037	26,566	26.3
2006	21,363	22,297	22,951	22,162	29,340	32.4
2007	22,297	23,578	24,178	23,348	31,916	36.7
2008	22,942	24,142	24,983	23,968	33,146	38.3
2009	23,605	24,720	25,814	24,606	32,202	30.9
2010	24,288	25,312	26,673	25,260	30,130	19.3
2011	24,990	25,918	27,560	25,932	29,982	15.6
2012	25,713	26,539	28,477	26,623	29,162	9.5

Source: NRA

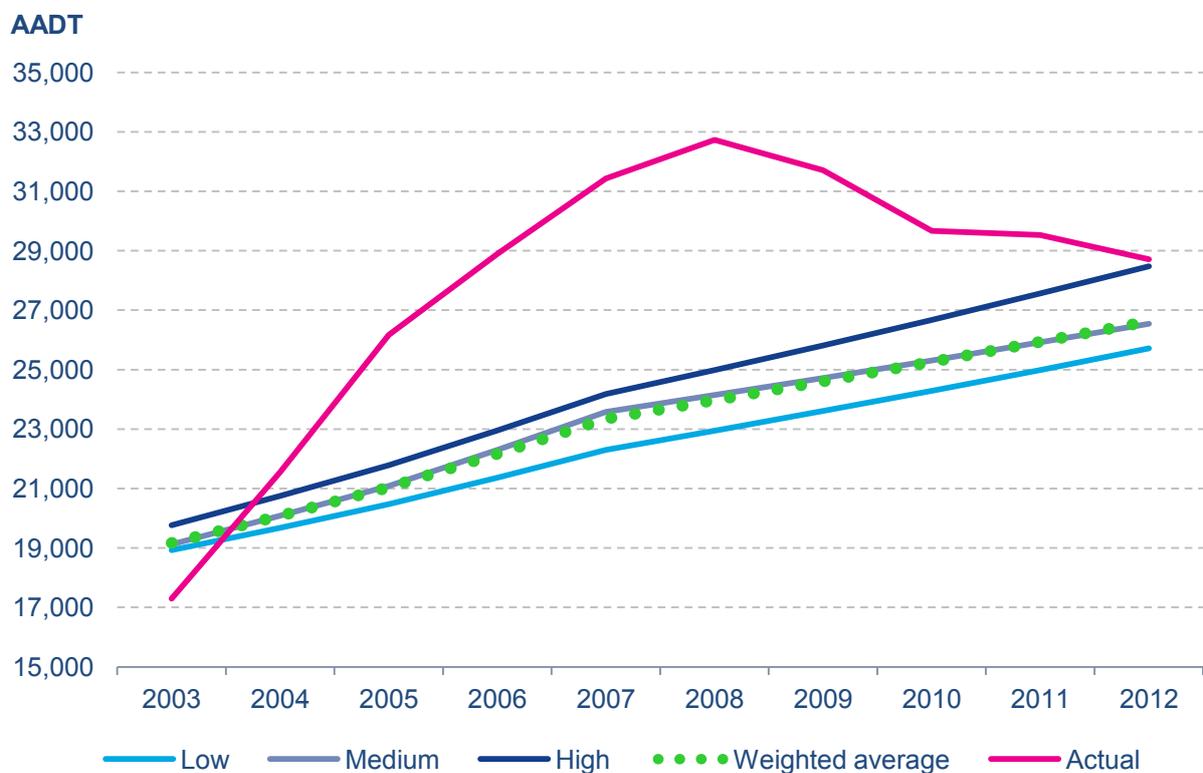


Figure 5.1: Forecast NRA and Actual Traffic Volumes (Source: NRA)

As Table 5.3 highlights, aggregate traffic volumes annually have been significantly in excess of even the high growth traffic forecasts since the opening of the Dundalk Western Bypass in 2005. The differential between forecast and actual traffic volumes has declined annually since 2008, reaching circa 10% in 2012.

5.4.2. Revenue Share Payments

The excess traffic volumes in the initial years of the motorway opening have resulted in some unanticipated revenue share payments to the NRA as set out in Table 5.4.

Table 5.4: Forecast and Actual Revenue Share Payments

Year	Forecast Revenue Share (€)	Actual Revenue Share (€)
2006	0	605,641
2007	0	1,291,225
2008	0	1,484,387
2009	0	665,300
2010	0	0
2011	0	0
2012	0	0

Source: NRA

5.4.3. Implications for Total Outturn Cost associated with PPP Option

As set out above, initial traffic levels using the M1 motorway have exceeded the levels forecast as part of the Value for Money assessment process, resulting in some unanticipated revenue share payments. A number of scenarios have been modelled in terms of estimating the total revenue share payable to NRA over the concession period, on the basis of the traffic that has materialised to date. The scenarios modelled include:

- **Scenario 1:** 2014-2032 traffic growth as per the low traffic growth scenario in the NRA PAG;
- **Scenario 2:** 2014-2032 traffic growth as per the medium traffic growth scenario in the NRA PAG; and
- **Scenario 3:** 2014-2032 traffic growth as per the high traffic growth scenario in the NRA PAG .

The level of revenue share toll payments over the life of the concession period (as set out in Table 5.5) is not forecast to materially alter the total net NRA cost associated with the scheme, relative to the that forecast as part of the VFM assessment process.

Table 5.5: NPV of Forecast NRA Revenue Share Payments 2006 – 2032, 2002 Prices

	Scenario 1 (€m)	Scenario 2 (€m)	Scenario 3 (€m)	PPP Bidder Using NRA Traffic Forecasts (€m)
Revenue Share €000	3.3	3.3	6.4	7.1

Source: AECOM estimates

Taking account of the actual revenue share payments paid to the NRA over the 2005 – 2012 period, and the forecast future traffic growth as above, estimated total revenue share payable to the NRA over the entire concession period yields somewhere between €3.3m and €6.4m NPV. This compares to €7m NPV which was estimated as part of the VFM assessment.

5.5. Summary

The Dundalk Western Bypass Scheme's implementation was reviewed in terms of the timing of the scheme, the quality achieved by the scheme and the actual materialised costs of the scheme against initial estimates.

The construction of the scheme commenced in February 2004 and completed in September 2005, five months ahead of Schedule.

The scheme was delivered in line with the specification set out in the concession contract. There have been no issues relating to the quality of the scheme post completion that have not been addressed speedily by the concessionaire, in line with the terms of the contract.

Since the opening of the Dundalk Western Bypass, the traffic volumes using the motorway have exceeded those forecast as part of the VFM assessment process, resulting in some revenue share payments above those forecast as part of VFM assessment. However, over the concession contract period the level of revenue share payable in respect of the M1 is unlikely to differ substantially to that forecast in VFM assessment (between €3.5m and €6.6m NPV)

On the basis of the traffic that has materialised, it is now estimated that the likely PPP outturn cost to the NRA will not differ substantially to the €-23 million forecast in the VFM Assessment. When compared to the financial comparator estimated cost, it can be seen that even in the absence of the need for a demand risk value in the FC, the decision to procure the Scheme as a PPP still stands.

6. Summary and Conclusions

The Dundalk Western Bypass Scheme was adequately planned both in terms of the statutory procedures, appraisal, routes selection and consultation and the planning undertaken in relation to the decision to procure the scheme as a Public Private Partnership (PPP).

One exception was that the appraisal was carried out over 10 years prior to the scheme construction and there was no re-appraisal of the scheme undertaken at Tender/Contract Award stage. This approach was in line with the available guidance at the time and a revised cost-benefit analysis at the tendering stage now forms part of the NRA Project Appraisal Guidelines. This addresses this shortcoming for all current/future scenarios.

The scheme has delivered on its objectives and the expected benefits and outcomes have materialised. The scheme has reduced traffic volumes and congestion in Dundalk Town, contributing to a reduction in traffic collisions on the R132 (old N1) and contributed to providing a continuous motorway route between Belfast and Dublin linking up significant national ports and airports.

During the implementation of the scheme, the appropriate management procedures adopted were satisfactory and in line with best practice guidance at the time. The implementation of the scheme as a PPP resulted in the scheme being delivered ahead of schedule and in line with the quality specified in the PPP contract. A review of the materialised traffic volumes on the scheme and current traffic forecasting procedures determined that the PPP outturn cost will not differ substantially to the level forecast in the Value For Money Assessment. It is therefore considered that the decision to procure the scheme as a PPP represents value for money for the Exchequer.

Appendix A: Overview of PPP Guidance

Developing the Infrastructure Requirements of the National Development Plan: Best Practice Guidelines for Project Implementation, Department of the Taoiseach, 2000

As part of its 2000 Best Practice Guidelines, the Department of the Taoiseach (DOT) stated that a public private partnership approach should be adopted wherever it would accelerate the implementation of a particular project and represent better value for money over the full life cycle of the project. The DOT also stated that the most appropriate form of PPP (ranging from design and build to design, build, finance and operate) should be adopted having regard to the particular circumstances of the individual project.

Framework for Public Private Partnerships, Working together for Quality Public service. 2000

In 2000, a framework document endorsed by IBEC, ICTU, CIF, the Department of Finance and the Departments and Agencies engaged in the PPP process was published by the Social Partners. In the Framework a clear statements of the principles underpinning the PPP programme were set out, namely:

- PPPs should yield value for money for the Exchequer;
- PPPs should allocate risks to the party best able to control and manage them; and
- PPPs should maximise the benefits of private sector efficiency, expertise, flexibility and innovation.

A Policy Framework for Public Private Partnerships (PWC), DOEHLG 2000

In 2000, the then Department of Environment, Heritage and Local Government commissioned PWC to produce a framework within which PPP projects could be advanced in the roads, water and waste sectors. The resultant Policy Framework detailed policy guidance covering each stage in the development, implementation and management of PPP projects. Some of the key guidance points identified in the resulting policy framework document include:

- **Market soundings** should be undertaken to determine the level of interest among the private sector and the capability of the private sector market to undertake prospective PPP projects.
- An **Output Specification** should be prepared which defines the services required by the public sector which the private sector would be responsible for providing as part of a PPP project. The actual design of the works necessary to deliver that service would be left to the successful private sector tenderer.
- A key driver of the PPP programme is the desire to increase **Value for Money (VFM)** in infrastructure procurement. To ensure that value for money is achieved, the Contracting Authority should be able to demonstrate that the option selected offers better value for money than the alternatives. The VFM assessment should not be seen as a single step but one that is carried through the life of the project. An initial PPP Assessment should be completed at the Option Appraisal stage to determine the potential for a PPP to deliver improved value for money compared with a traditional procurement. The final VFM assessment can only be made at the conclusion of the procurement process.
- In the case of projects where the public sector is the sole or main purchaser, the VFM undertaken at the end of the procurement process should comprise two key elements:
 - Monetary comparison – a comparison of the cost of the preferred Public Private Partnership tender, with the cost of traditional public sector procurement (the Financial Comparator), expressed in terms of discounted cashflows over the life of the PPP contract; and

- Non-monetary comparison – a comparison of all the factors that are difficult to quantify in monetary terms, but their value to government and the wider public is significant. Examples include speed of project delivery, quality of service, and security of supply.
- One of the principles underlying PPPs is that risk should be allocated to the party best able to manage it. A detailed **risk assessment** should be undertaken for every PPP project.
- Central and Contracting Authorities will need to retain legal and financial advisers, as well as technical specialists, especially for Design, Build, Operate and Finance contracts and Concession contracts.

Policy Framework for Public Private Partnership (PPP) in Ireland: Project Implementation in the Local Government Sector, DOEHLG, Nov 2003

In 2003, the then Department of Environment, Heritage and Local Government published a policy framework document to guide the local government sector in the implementation of PPPs. The guidance highlighted the steps which all public projects must follow to ensure that the projects are properly examined and assessed, that the necessary statutory and administrative approvals are obtained, and that the procurement process is carried out in an efficient manner. It also highlighted the PPP specific tasks in relation to those steps, as follows:

- Project Identification – on the basis of an established business case/need for a project, the project receives the approval of a Sanctioning Authority. If a PPP approach is being considered some **market soundings** may be carried out to establish if there is market interest in the project.
- Option appraisal – during this phase various options for carrying out the project are examined, if the preferred option is a PPP, a PPP assessment report is completed which: determines the form the PPP will take; and establishes the **optimum allocation of risk** between public and private sector. Stakeholder consultation is carried out as part of a PPP Assessment Report. If the PPP procurement route is chosen, Department approval is sought before a Project Auditor is chosen, external advisors appointed, and a project steering group established.
- Statutory processes – the LA is responsible for preparing the project to go to procurement, including ensuring that the various planning and land acquisition and access consents are obtained.
- Pre-procurement - a **Public Service Benchmark (PSB)** cost is prepared, Departmental approval is sought for the project to go to procurement and an affordability cap is set based on the PSB.
- Procurement – the project is taken through the procurement process, when completed a tender recommendation report is submitted, and Departmental approval is sought to go to construction.
- Construction and operation – the contractor commences construction, variations may need to be referred to Department. When the LA is satisfied with the infrastructure provided, it signs off on the project and the operational contract commences.
- **Review of the PPP Process** – the performance of the project is reviewed
- Expiry of Contract

The Review of the PPP Process refers to the review of the performance of the project. As part of the policy framework document, the DOEHLG identified the objectives associated with the post project review of PPPs as follows:

- provide data on costs as an input to assessments (Public Sector Benchmarks) of subsequent PPP projects;
- provide public authorities with information on the economic benefits, or otherwise, of the PPP approach over alternative procurement approaches;
- identify the strengths and weaknesses in the systems in place for managing PPP projects.

It was noted that the Review of PPPs should contain the following:

- a brief description of the project;
- an outline of the project history with key decisions /events highlighted;
- a variance analysis of the final outturn costs of the project compared against initial estimates, the PSB, Affordability Cap and the Final Contract price;
- an analysis of the time taken to complete different stages of the project compared with projections; and
- the extraction of selected costs for the Department's database of costs on PPP projects.

Guidelines for the Provision of Infrastructure and Capital Investments through Public Private Partnerships: Procedures for the Assessment, Approval, Audit, and Procurement of Projects, 2006, Department of Finance

The Department of Finance (DOF) 2006 Guidelines for the Provision of Infrastructure and Capital Investments through Public Private Partnerships replaced Interim Guidelines published by the DOF in July 2003. The 2006 DOF Guidelines identified four distinct strands or functions associated with PPP projects as follows: the project appraisal function, the approval function, the procurement function and the audit function. Best practice would require an appropriate separation of functions between these strands.

1. The Sponsoring Agency is responsible for appraising projects. As part of the Detailed Appraisal, the Sponsoring Agency should determine the most appropriate procurement mechanism and, if a PPP approach is being considered, a PPP Procurement Assessment should be carried out.
2. Following appraisal of the proposed project, the Sponsoring Agency should approach the Sanctioning Authority for approval to proceed with the procurement of the project as a PPP.
3. PPP projects must be procured in line with all regulatory and EU procurement requirements in regard to tendering and bid evaluation.
4. There is a particular audit requirement in regard to PPP which is additional to the requirements outlined in the *Capital Appraisal Guidelines*, i.e. the appointment of a Process Auditor. A Process Auditor must be appointed for all PPP projects or grouped PPP projects where the capital cost is in excess of, or is likely to exceed, the limit specified by the Department of Finance (then €20 million).

Some of the key guidance points identified in the DOF 2006 Guidelines include:

- **Affordability:** A Sanctioning Authority should not allow a project to proceed unless it is satisfied that the overall capital cost of the project as a whole, including both PPP and non-PPP elements, can be accommodated within the Capital Envelope allocation(s) available to the Sponsoring Agency.
- **Value for Money:** VFM needs to be considered at two levels:
 - The overall VFM of the project – i.e. does the project as a whole offer good value for money; and
 - The VFM of the PPP contract – i.e. do the aspects of the project that are being procured by PPP represent good value for money, particularly when compared with the cost of achieving the same objective by traditional procurement (as represented by the Public Sector Benchmark (PSB)).

Four formal VFM tests should be carried out at the following points:

1. at PPP Procurement Assessment – a test carried out to determine whether, and in what form, a PPP arrangement has the potential to offer the best value for money solution for the procurement;
 2. at Completion of the Public Sector Benchmark (PSB) – to determine whether, in light of the quantifications in the PSB, the conclusion reached in the PPP Procurement Assessment still holds;
 3. at Tender Evaluation stage - to compare the highest ranking bid against the PSB, to assess whether the highest ranking bid offers a potential value for money solution; and
 4. at Financial Close – a final test carried out (a) to assess the impact of any changes in the interest rate and/or discount rate and (b) where the project has been procured using the Negotiated Procedure, to examine the effect of any proposed changes in the contract terms.
- The Sponsoring Agency should draw up a detailed **Output Specifications** for the project, focusing on outputs rather than inputs.
 - A **Public Sector Benchmark (PSB)** - a comprehensive estimate of the cost (including risk valuations) of procuring those elements of the project that the private sector is to be invited to tender for in the PPP contract - is derived from the Output Specifications. The final PSB cost should be expressed in Net Present Value (NPV) terms, thereby reflecting the time value of money. The Output Specifications and PSB should be finalised and should be up to date before any tender invitations are issued.
 - In any procurement competition, all of the tenders received are first examined to determine whether they are “suitable” bids. Having identified the highest ranking bid received, the next step is to examine the value for money of that bid.
 - As part of a **Post Project Review** a comparison of the actual outturn costs of the project (as provided for in the contract) with the initial estimated costs (as set out in the PSB) should be undertaken and recorded. A Post Project Review aims to draw lessons for the future and, therefore, any significant lessons learned from the review should be translated into changes in the Sponsoring Agency’s project practices. Each Sponsoring Agency should maintain a cost database which should be used when benchmarking costs for future projects and in the compilation of future Public Sector Benchmarks. The post project review exercise should be used to inform and update this database with the latest available information. In addition, each sector should maintain a sector-specific risk database.
 - In many instances, a PPP contract will include clauses that link payment to performance of specific obligations under the contract. In order to ensure that the full benefit is derived from these clauses, it is essential that the performance of the private sector partner is constantly monitored over the contract term and that these clauses are invoked, as appropriate.

Appendix B: Review of Components of Financial Comparator

As previously identified, the cost and revenue items comprising the net NRA costs under the PPP scenario were not determined by the NRA, rather they were determined by the PPP Concessionaire on the basis of the Concessionaire's own estimates of the costs and toll revenues they would likely incur in providing and maintaining the infrastructure. The analysis below is thus restricted to reviewing whether the costs and revenues comprising the Financial Comparator were reasonable approximations of the costs and revenues attributable to the NRA under a traditional procurement scenario.

There are three core elements comprising the net NRA costs associated with the traditional procurement (Financial Comparator) scenario. These are namely:

- overall construction, operational and lifecycle costs associated with constructing and operating the Scheme (including the road and tolling facility);
- values assigned to the risks (both cost and revenue) assumed by the NRA; and
- the revenue from tolls.

The assumptions used in the VFM assessment with respect to each of these components are reviewed in Sections B1 – B.3 below.

B1 Construction, O&M and Lifecycle Cost Estimates used in FC

The costs for each element as estimated in the original Financial Comparator (at ITN stage) are compared to the estimates provided by the four shortlisted ITN bidders in Tables B1 – B3 below.

Table B1: Construction Costs as per Pre-Tender Estimate and ITN bidders (2002 prices)

	Design (€000) ITN	Super- vision (€000) ITN	Prelims (€000) ITN	Works (€000) ITN	Tolling (€000) ITN	Other	Total
Non Risk adjusted Pre- tender estimate	1,822	5,979	11,082	97,205			116,088
Tender 1	██████	██████	██████	██████	██████		113,563
Tender 2	██████	█	██████	██████	-	██████	111,881
Tender 3	██████	██████	██████	██████	-	██████	113,383
Tender 4	██████	█	██████	██████	-	██████	95,520

Source: Dundalk Western Bypass Technical Evaluation Report September 2002

On the basis of the data provided in Table B1, it is concluded that on aggregate, the construction costs estimates forming part of the Financial Comparator at ITN were good approximations of the estimated costs associated with these expenditure items.

Table B2: O&M Costs as per Pre-Tender Estimate and ITN bidders

	O&M 2006 (€000) ITN	O&M 2015 (€000) ITN
Non Risk adjusted Pre-tender estimate	5,324	5,995
Tender Average	5,411	5,596

Source: Dundalk Western Bypass Technical Evaluation Report September 2002

On average the O&M costs as bid by the Tenderers were similar to those estimated at ITN stage in the Financial Comparator.

Table B3: Lifecycle Costs as per Pre-Tender Estimate and ITN bidders

	(€000) ITN
Non Risk adjusted Pre-tender estimate	117,197
Tender Average	53,261
Tender 1	██████
Tender 2	██████
Tender 3	██████
Tender 4	██████

Source: Dundalk Western Bypass Technical Evaluation Report September 2002

Life-cycle costs (which include mid-contract resurfacing, replacement of road signs, safety fencing and lights, an extension of the toll plaza, and purchase of new equipment) as bid by the ITN Tenderers were lower than the pre-Tender estimate, ranging from the highest at ██████ below the pre-Tender estimate, to the lowest at ██████ below the pre-Tender estimate.

B2 Review of Risk Cost and Revenue Estimates in FC

Risk analysis formed an important element of the VFM assessment process. In determining the risk adjustments that needed to be applied to the base costs and revenues forming the Financial Comparator, risk workshops were held where key stakeholders gave consideration to “how risks had occurred in the past in the public sector and how they could be managed in the future, attempting to avoid optimistic bias in estimates” (Financial Comparator Dundalk Western Bypass BAFO Update September 2003, pg 17).¹³

Each of the quantifiable risks identified, were categorised according to whether they belonged to the following categories: project specific risks; planning risks; design risks; construction risks; operating risks; demand risks; financial risks; or legislative risks. Table B5 sets out the risks items identified in the risk register, their allocation under the procurement type scenarios, as well as the value put on the risk during the risk workshops.

¹³ As part of the risk analysis, the following process was adopted: Risk registers were prepared which identified, categorised and allocated the main project risks to either the NRA or the PPP Company depending on who would bear the risk under the FC or PPP procurement scenarios; The risks were prioritised and quantified through a series of risk workshops and reviews; The risks were modelled in order to calculate the expected financial impact of the risks over the concession period.

Cost Risk

As set out in Table B4, the major cost risks retained by the NRA under the traditional procurement FC scenario related to: construction risks, which totalled circa €30 million or 24% of the total base construction costs; operating cost risks which totalled €10 million or 13% of the total base operating costs; and whole life cost risks totalling €5.9 million or 11% of the Scheme's whole life costs. The total cost risk value, which totalled €61m or 21% of the total estimated Scheme costs, is considered to represent a broadly standard estimation of cost risks, in light of the history of cost overruns in previous road schemes.

Demand Risk

As part of the Financial Comparator, the forecast value of total Toll Revenue was estimated having recourse of the weighted average traffic forecasts, which were based on 25%/60%/15% probabilities being assigned to low/medium/high traffic growth scenarios respectively. Owing to the small difference between the low, medium and high traffic forecasts, and probabilities used, the weighted average forecasts were not in effect very different to the medium/central traffic forecasts, (circa -0.6% difference in 2006). Because the weighted average traffic forecasts did not differ substantially from the medium traffic, a relatively small value was attributed to this risk item¹⁴. It would have been expected that the value of risk associated with 'user-charging' (i.e. failure to secure anticipated toll revenue) would have been greater than -€2m allocated to this risk item. In practice very little downside risk was assumed. Consideration of possible variability in demand suggests that the level of risk associated with 'user-charging' would be higher, given the nature of the proposed Scheme. The Dundalk PPP Scheme was unique in the overall NRA PPP Roads Programme, as it is the only project that due to the construction timing had the toll road open prior to the PPP Contract award. Notwithstanding this, consideration of possible variability in demand (owing to changed economic circumstances) over time suggests that the level of risk associated with 'user-charging' would have been higher, given the nature of the Scheme.

Conversely, the value of demand risk associated with external developments (i.e. the reduced tolls due to limited inflationary price increases) at €71m (representing 20% of total forecast toll revenue of €348m) appears high.

¹⁴ Owing to the use of weighted average traffic forecasts in estimating toll revenue under the traditional procurement scenario, it is not clear why an additional user risk value associated with User Charging was incorporated into the FC to account for demand side risk. However, the scale of effects in terms of overall net costs associated with FC scenario are small.

Table B4: Overview of Cost Risks in Financial Comparator (NPV 2001 Prices)

Risk Category	Overview of Risk Type	Allocation of Risk	€000 (% of Relevant Base Costs)	Total Risks
Project specific	Risks predominately related to construction, including unforeseen archaeological sites, concerns relating to the railway bridge works, and potential shortage of imported material	FC – all retained by NRA with exception of one item related to shortage of material PPP – all transferred to PPP Co	5,128 (6% of base construction costs)	
Planning	Risks relating predominately to obtaining scheme approval	FC – retained by NRA PPP – all transferred to PPP Co apart from statutory approvals which is retained by NRA	392 (0% of construction costs)	
Design	Risks related to the Scheme design including the potential for design drift and additional design costs as more detailed information becomes available	FC – retained by NRA PPP – all transferred to PPP Co	2,768 (2% of base construction costs)	
Construction	Risks relating to construction including: variations (7.2m), ground works (5.6m), estimating errors (5.0m), structures (2m), drainage (€1.7m), construction inflation (€0.3m)	FC – all retained by NRA PPP – all transferred to PPP Co	29,845 (24% of base construction costs)	
O&M	Risks relating to operation and maintenance include the risks of estimation errors (€3.3m), service non availability (€1.4m), inflation (€1.4m), third party claims (€1.4m)	FC – all retained by NRA PPP – all transferred to PPP Co	10,016 (13% of base operating costs)	
Lifecycle	Risks relating to a poorer than expected performance of key construction elements and/or materials	FC – all retained by NRA PPP – all transferred to PPP Co	5,925 (11% of base lifecycle costs)	
Tolling	Risks relating to operating and lifecycle costs	FC – all retained by NRA PPP – all transferred to PPP Co	6,230 (9% of base tolling related costs)	
Financial	Risks relating to variables including interest rates and other cost of finance fluctuations, as well as insurance costs	Majority transferred to PPP Co in each scenario	916	
Legislative	Risks relating to legislation		-	
Total Cost Risk				61,220
Demand	Risks relating to the uncertainty associated with the estimation of future traffic levels and ultimately toll revenues. Total demand risk is comprised of reduced revenue due to limited inflation (71m); leakage of tolls (17.6m); user charging (2m) and late revenue collection (7m).	FC – all retained by NRA PPP – shared with the PPP Co in line with Revenue Share agreement - with exception of leakage of tolls which is fully transferred to PPP Co	86,635 (25% of total tolling revenues)	
Total Revenue/Demand Risk				86,635

Source: Financial Comparator Dundalk Western Bypass BAFO Update September 2003

Table B5: Summary of Demand Risk Items

Risk Item	€m	%
External developments - reflects reduced toll revenues due to the risk of a delayed start of toll indexation and decreased level of toll indexation	71	47.8
Leakage of tolls – reflects reduced toll revenues on basis of 5% of toll revenues being lost due to users not paying, users paying incorrectly, potential double use of tickets	17.6	11.9
User Charging – reflects failure to secure anticipated toll revenue because of lower levels of traffic volumes due to adverse economic circumstances; probabilities were assigned to low, medium and high traffic scenarios	(2)	-1.3
Total	86.6	

Source: Financial Comparator Dundalk Western Bypass BAFO Update September 2003

B3 Review of Toll Revenues in Financial Comparator

The key determinants of the estimated NRA toll revenues in the FC scenario were the forecast traffic volumes using the new motorway infrastructure.

Traffic Volumes

The revenue attributable to the NRA (in the case of the FC - where all toll revenue would be attributable to the NRA), was estimated in the VFM Assessment process using weighted average traffic forecasts, which was based on 25%/60%/15% probabilities being assigned to low/medium/high traffic growth scenarios respectively

Since the opening of the Dundalk Western Bypass the traffic levels using the M1 tolled motorway have exceeded the weighted average forecasts used as part of the VFM assessment process¹⁵. Notwithstanding this, because of the relatively high rate of traffic growth that was forecast over the entire concession period, which is now considered ambitious over the longer term, it is considered likely that the differential between forecast and actual traffic volumes is likely to continue to decline.

On the basis of the traffic levels that have materialised to date, and likely future traffic growth levels (as per the NRA Project Appraisal Guidance), it is estimated that toll revenue from the Scheme under the traditional procurement scenario, where the State would have retained responsibility for tolling the Motorway, would likely total between €310 and €335 million NPV over the life of the concession (non risk adjusted NPV total). This value can be compared to the €348m NPV estimated in the VFM assessment.

¹⁵ The traffic forecasts prepared as part of the 2001 Tolling Study were subsequently altered by the NRA's traffic consultants, on the basis of more up to date information, to prepare high, medium and low traffic growth scenarios for the Scheme's PPP Value for Money Assessment.

Appendix C: Technical Note on Public Sector Benchmark

The following is an extract from the Technical Note on the compilation of a Public Sector Benchmark for a Public Private Partnership Project published by the Department of Public Expenditure and Reform which outlines current policy relating to disclosure of the Public Sector Benchmark.

“1.15 Disclosure of the Public Sector Benchmark

Current policy is that the PSB, or any elements thereof, is / are not made public during the tendering process on the basis that revealing the amount that the State is willing to pay may give tenderers an opportunity to increase their asking price above what they might otherwise seek. Where the public sector is likely to procure a similar project in the same or other sectors in the foreseeable future, the PSB (or any elements thereof) should not be released, even after the completion of the tendering process.

In the case of a once-off project, where it is not likely that there will be any similar procurement in the future, the release of the PSB after the contract has been signed could be considered, subject to the non-disclosure of risk valuations (see below). However, before releasing any of the PSB documentation, the Sponsoring Agency must be satisfied that none of the information being released could diminish the potential to secure value for money bids when procuring future projects.

If the Sponsoring Agency is satisfied that it is in order to disclose the PSB, it must advise the Sanctioning Authority of its intention to do so and of the basis for disclosure.

In no circumstances should the individual risk valuations set out in a PSB be disclosed and no information should be released in a format that would permit the identification of risk values. To do so would provide information on how the public sector values risk, which would prejudice the ability of the public sector to secure value for money in current and future projects through risk transfer. Similarly, it is important to ensure that information relating to the demand projections used in the development of a PSB for a Concession project (e.g., the Sponsoring Agency’s traffic forecasts for a toll road) is not disclosed.

Disclosure of any aspect of the PSB could have an adverse effect on the conduct by the Sponsoring Agency of PPP contract negotiations, particularly as information contained in the PSB could disclose positions taken in past or current negotiations and, indeed, positions that may be taken in future negotiations. Disclosure of the PSB, or elements thereof, may also give rise to an unwarranted loss to the Sponsoring Agency and/or an unwarranted gain to the private sector as access may be given to financial, commercial, industrial, scientific or technical information that belongs to the Sponsoring Agency.

The PSB, like other confidential and similar information relating to projects, is of course available to the Comptroller and Auditor General for inspection in connection with any reports his / her office may be progressing.”

M3 Clonee to Kells

Post Project Review



December 2014

Erratum Sheet

Post Project Review reports - Corrections

The Post Project Review reports were not originally intended for an external audience. There are in some cases errors in the reports with such errors ranging from typographical errors to in a small number of cases incorrect statements or errors in interpretation of the data (which have been identified as a consequence of subsequent reviews). We suggest that the following errata are taken into account when reviewing these reports.

2.3 Scheme Planning page 11

The proportion of vehicles in each category used in both studies is shown in Table 2.6 below. It shows that the economic appraisals assumed a 20% share of traffic for HGVs. This is well in excess of the 11% level predicted by the traffic studies. This raises concerns about the robustness of the economic appraisals.

Should read

The proportion of vehicles in each category used in both studies is shown in Table 2.5 below. It shows that the economic appraisals assumed a 20% share of traffic for HGVs. This is well in excess of the 11% level predicted by the traffic studies. This raises concerns about the robustness of the economic appraisals.

Important Notice

This report has been prepared by AECOM Limited. It is based on information and explanations provided by the National Roads Authority and has been prepared for the sole use of the National Roads Authority.

This Post Project Review report contains certain information of a commercially sensitive nature and should be kept confidential. This report contains information relating to tenderer's pricing and contains information on the Public Sector Benchmark. The PPP Guidelines (Technical Note on the compilation of a Public Sector Benchmark for a Public Private Partnership Project¹) published by the Department of Public Expenditure and Reform require public bodies to keep information relating to the Public Sector Benchmark confidential. This PPR report contains information relevant to the State's approach to evaluation of value for money in PPP competitions that the State may adopt in its future PPP competitions. Release of certain information contained in the Post Project Review report, whether on foot of freedom of information request or otherwise, would likely impact negatively on the State's commercial interests and would accordingly, not be in the public interest. In the event that the recipient receives any request to disclose any information contained in the Post Project Review report (whether pursuant to freedom of information legislation or otherwise), we would ask you to notify the National Roads Authority of this request prior to any disclosure being made so that our comments may be taken into account in any decision that might be taken in this regard.

¹ Appendix C contains an extract from the Technical Note on the compilation of a Public Sector Benchmark for a Public Private Partnership Project which outlines current policy relating to disclosure of the Public Sector Benchmark.

M3 Clonee to Kells

Post Project Review

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Appendix A: Overview of PPP Guidance

Appendix B: Review of Components of Financial Comparator

Appendix C: Technical Note on Public Sector Benchmark

Executive Summary

The M3 Clonee to Kells Scheme involves the provision of 49 km of 2-lane dual carriageway motorway and 13 km of single carriageway along with associated junctions and link roads forming part of the N3 route from the north-western side of Clonee to the north of Kells. The scheme is tolled at two points along the route. Toll plazas are located on the Dunboyne to Dunshaughlin and Navan to Kells sections of the scheme.

Procurement of the scheme commenced in April 2002 with the contract awarded in April 2007. The scheme opened in June 2010 two months ahead of schedule.

Since the opening of the M3 Clonee to Kells Scheme, the traffic volumes using the scheme have been significantly lower than forecasts. Nonetheless, the scheme has contributed to a reduction in the volumes of traffic in the towns along the old N3 corridor and a reduction in overall traffic congestion.

The economic appraisal of the scheme was published in 2004 and demonstrated a strong economic case for the scheme. However, the traffic volumes using the scheme to date are significantly below the levels forecast in the economic appraisal. In addition, the economic appraisal was based on a higher proportion of heavy goods vehicles (HGVs) using the scheme than is currently the case.

Due to the significant reduction in overall traffic volumes and HGVs using scheme compared to those forecast economic appraisal, it is not possible to make an accurate assessment of the economic value of the scheme.

The decision to procure the scheme as a PPP was also reviewed. Having regard to the shortfall in traffic volumes, the revenue share payments to the NRA will be much reduced over the lifetime of the scheme. In addition, traffic guarantee payments will be made from the NRA to the PPP Concessionaire for a portion of the life of the project.

However, due to the PPP Concessionaire assuming a large share of the risk (and cost) associated with low traffic levels using the scheme, the net cost of the scheme would be higher under traditional procurement. Therefore the decision to procure the scheme under the PPP option is justified.

Given the concerns over the economic appraisal carried out, and having regard to the shortfall in traffic volumes from those predicted it would be advisable to undertake a new traffic study and updated economic appraisal of the scheme based on the best available current information. This would allow a more comprehensive assessment of the scheme to be carried out and provide a benchmark to measure future performance against.

1 Introduction

1.1 The Scheme

The M3 Clonee to Kells Scheme involves the provision of 49 km of 2-lane dual carriageway motorway, 13 km of single carriageway, 24 km of link roads and six grade separated junctions.

The scheme includes a motorway along the N3 route from the north-western side of Clonee to south of Kells. In addition, the scheme also includes a wide single-carriageway from the end of the motorway section to join up with the existing N3 to the north of Kells.

The scheme is tolled at two points along the route. These are located on the Dunboyne to Dunshaughlin and Navan to Kells sections of the scheme.

Figure 1.1 Map of M3 Clonee to Kells Scheme



Procured as a Public Private Partnership (PPP) project, the Contract was awarded to the Eurolink Consortium in April 2007, and will extend for 45 years from that date. In June 2010 the scheme was opened. Built as part of a Concession PPP Scheme, users of the motorway are tolled in accordance with the Toll Byelaws developed for the scheme.

This report comprises a Post Project Review of the M3 Clonee to Kells Scheme.

1.2 Guidelines for Post-Project Review

Post Project Reviews are typically carried out a few years after the opening of a scheme. This allows the reviewer to make an initial assessment of the performance of the scheme.

The current standards for Post Project Reviews (PPR) of capital infrastructure projects are those set out in the '*Public Spending Code*' first published by the Department of Public Expenditure and Reform (DPER) in 2011. This Code specifies that the aim of such a PPR is to determine whether:

- The basis on which a project was undertaken proved correct;
- The expected benefits and outcomes materialised;
- The planned outcomes were the appropriate responses to actual public needs;
- The appraisal and management procedures adopted were satisfactory; and,
- Whether conclusions can be drawn which are applicable to other projects, to the ongoing use of assets, or to associated policies.

Since the early 2000s successive guidance documents have been published by various Government departments which set out the recommended steps that should be undertaken when implementing PPP projects in Ireland to ensure better value for money for the exchequer.

The available guidance at the time includes interim guidelines published by the Department of Finance² and a policy framework by the Department of Environment Heritage and Local Government³. Both of these were published in 2003 at which point planning for the M3 Clonee to Kells Scheme was well advanced. An overview of PPP guidance is provided in Appendix A.

The PPP guidance that was in place at the time the M3 Clonee to Kells Scheme was being planned was not as comprehensive as the most recent guidelines.

The available guidance allowed the identification of some of the key areas that should be covered when completing Post Project Reviews of PPP Schemes, including

- Reviewing the PPP planning steps;
- Reviewing the PPP procurement decision; and
- Reviewing the PPP scheme implementation.

Similarly the NRA's project appraisal guidance has evolved through the years with the NRA's Project Appraisal Guidelines (first published in 2008⁴) determining the current recommended process to be followed.

On the basis of the overview of the guidance above, a two part approach to this Post Project Review was adopted. In the first instance, a value for money review of the scheme itself was undertaken, identifying the established project need, whether the project design process was properly planned, and whether the project is delivering benefits in excess of costs.

The second part of this Post Project Review (PPR) comprises a value for money review of the decision to procure the scheme as a PPP. This includes a review of the PPP pre-planning steps undertaken, a review of the PPP procurement decision, and a review of the PPP scheme implementation to date in terms of expected outcomes.

1.3 Layout of the Report

The broad structure of PPR is as follows: Section 2 outlines a traditional Post Project Review of the M3 Clonee to Kells as a scheme. This is in line with the NRA *Project Appraisal Guidelines* (PAG), the DPER *Public Spending Code* and the Department of Transport's '*Guidelines on a Common Appraisal Framework for Transport Projects and Programmes*', 2009.

² Interim Guidelines for the Provision of Infrastructure and Capital Investments through Public Private Partnerships – Department of Finance, July 2003

³ Policy Framework for Public Private Partnership (PPP) in Ireland – Department of the Environment Heritage and Local Government, November 2003. Note: Appendix 1 of the framework document provides a detail of the key documents in the PPP area prior to 2003

⁴ The Project Appraisal Guidelines were first published in 2008 and have developed incrementally from that point

Sections 3-5 focus on a review of the procurement of the scheme as a Public Private Partnership (PPP). Section 3 reviews the pre planning steps carried out by the NRA prior to procuring the scheme as a PPP. Section 4 reviews the basis of the decision to procure the scheme as a PPP, while Section 5 is concerned with the PPP project outturn relative to the outturn anticipated. Finally Section 6 presents a summary of the PPR findings and recommendations.

2 Scheme Review

2.1 Introduction

As identified in Section 1, the *'Public Spending Code'* identifies a number of questions that need to be answered as part of a Post Project Review of a scheme. The approach taken here to address the requirements of the Code is to identify key stages in the scheme development and the key questions regarding each stage that address the requirements set out in the Code, as follows⁵:

- Scheme Conception
- Scheme Planning
- Scheme Implementation
- Scheme Operational Performance

2.2 Scheme Conception

2.2.1 Background

The M3 Clonee to Kells Scheme was procured as a Public Private Partnership incorporating the design and construction of 49 km of new standard two-lane motorway, 13 km of single carriageway roads and ancillary roads.

The M3 Clonee to Kells Scheme is an integral element of the national road network, forming part of the N3 corridor to the north-west.

The existing N3 between Clonee and Kells generally consisted of single carriageway road passing through the centre of towns such as Dunshaughlin, Navan and Kells. There was considerable traffic congestion in these towns (exacerbated by traffic lights within the towns) impacting the quality of life of residents. Some schemes had been introduced to relieve congestion such as the Navan Relief route (an urban single carriageway section in Navan). The majority of the route from Clonee to Kells had no hard shoulders. There was little opportunity for overtaking with traffic travelling in platoon formations⁶.

The scheme was developed as a PPP scheme on the basis that a PPP could deliver

- (i) value for money when compared to traditional procurement;
- (ii) facilitate the injection of private finance and accelerate the delivery of the national road improvement schemes to reduce Ireland's infrastructural deficit; and
- (iii) ensure a high quality route that would offer a greatly improved service for users of the then existing N3, that would be capable of accommodating significant traffic volumes.

The Contract to construct the scheme was awarded in April 2007 and the scheme opened in June 2010.

2.2.2 Need and Objectives

The need for an improved N3 route between Clonee and Kells was identified in a number of national and local policy documents, including:

- The National Road Needs Study 1998
- The National Development Plan 2000-2006
- County Meath Development Plan 2001-2007

⁵ A more detailed summary of the relevant stages and key questions are set out in Appendix A.

⁶ Platoon formations occur when groups of cars travelling at higher speeds travel in convey behind a car of lower speed due to the absence of overtaking opportunities.

The National Road Needs Study identified the need for improvements along the N3 route and recommended a dual carriageway from Clonee to Kells.

The National Development Plan 2000 – 2006 identified the need for investment on the N3 route from Dublin to Cavan and Belturbet linking to Enniskillen. The M3 Clonee to Kells Scheme forms part of this route and was identified in the plan as a candidate for Public Private Partnership based on user toll financing.

The Meath County Development Plan 2001-2007 identified a development objective for “*The provision of a new motorway on the N3 to Kells including bypasses of Dunshaughlin, Navan and Kells*”.

2.3 Scheme Planning

2.3.1 Current NRA Project Management and Appraisal Guidance

The present day guidelines were not in place at the time the M3 Clonee to Kells Scheme was being developed. Indeed, the experience of this and other similar schemes is likely to have been an input to the development of the current guidelines. Nonetheless it is useful to examine the present day guidance.

As part of the NRA’s current Project Management Guidelines (2010) and Project Appraisal Guidelines (2008 onwards) there are a number of recommended steps involved in the planning of a new road development. These are summarised in Table 2.1.

Table 2.1 Summary of Key Deliverables as per Current Guidance

Phase	Project Management Guidelines Deliverables	Project Appraisal Guidelines Deliverables
2 – Route Selection	Public Consultations Route Selection Report Variation to County Development Plan Public display (preferred route)	Traffic Modelling Report Cost Benefit Analysis Updated Project Brief Preliminary Business Case Project Appraisal Balance Sheet
3 - Design	Design Report	Revised Traffic Modelling Report CBA (using Target Cost and Total Scheme Budget)
4 – Statutory Processes	EIS/CPO documents	Revised Traffic Modelling Report CBA (using Target Cost and Total Scheme Budget) Updated Project Brief Revised Project Appraisal Balance Sheet Business Case
5 – Tender & award	Tender Documents Tender Report	Updated Traffic Modelling Report Updated Cost Benefit Analysis Updated Project Brief Updated Project Appraisal Balance Sheet Final Business Case

Source: NRA Project Management Guidelines 2010

2.3.2 Guidance in Place at Scheme Preliminary Design Stage

Both the 2010 Project Management Guidelines and the 2008 Project Appraisal Guidance were put in place by the NRA post the awarding of the contract for this scheme. Some elements of the scheme also pre-dated the NRA’s 2000 Project Management Guidelines and the DOT 2004 published ‘*Parameter Values for Use in Cost-Benefit Analysis of Transport Projects*’.

The main source of appraisal guidance in place at the time of the implementation of the scheme was the UK Design Manual for Roads and Bridges (DMRB) and the UK Treasury Taskforce policy

statements and technical notes⁷. In addition, the National Roads Needs Study (1998), included forecast traffic growth on the national road network in Ireland over the period to 2019.

2.3.3 Traffic Analysis and Forecasting

A number of traffic studies were commissioned by the NRA and Meath County Council to examine the traffic flows and the various tolling options for the M3 Clonee to Kells scheme. The studies were carried out by a combination of Halcrow Barry, MCOS and Arup in 2001 and 2002.

The key findings of the traffic studies were included in the Preliminary Design Report for the scheme⁸.

A number of reports prepared for Meath County Council by Dr D O'Connell of University College Cork (UCC) were used as inputs for the traffic studies, notably:

- Prediction of Traffic Volumes on the N2/N3 (Sep 1999)
- Kells Bypass Traffic Prediction (Nov 1999)
- Prediction of Traffic Volumes on the R157 (1999)

In addition, traffic counts, origin-destination surveys and journey time measurements were used as inputs to the study.

A computerised traffic simulation model (SATURN) was prepared representing existing conditions on the road network, and modelling the effects of the M3 Clonee to Kells Scheme proposal using 1999 as a base year.

Traffic forecasts are made for three separate years, namely 2004, 2014 and 2024.

A number of scenarios were examined including varying toll locations and rates.

The annual average traffic growth used in the study for the period 1999 to 2024 ranged from 4.0% to 4.8% for cars and from 2.9% to 3.7% for HCVs at various locations along the corridor.

The traffic figures provided in Table 2.2 below show the traffic forecasts from both the traffic study for the tolling locations and approximate toll level implemented in the scheme.

Table 2.2 Forecast Average Daily Traffic Flows on M3 Clonee to Kells Scheme

	Traffic Levels			Growth	
	2004	2014	2024	04-14	14-24
Clonee-Dunboyne	25,600	41,400	64,400	4.9%	4.5%
Dunboyne-Dunshaughlin	20,200	33,200	54,700	5.1%	5.1%
Dunshaughlin-Blundelstown	15,200	26,200	44,000	5.6%	5.3%
Blundelstown-Navan South	19,500	35,300	53,100	6.1%	4.2%
Navan South-Navan North	8,300	14,600	30,200	5.8%	7.5%
Navan North-Kells	12,600	19,100	30,300	4.2%	4.7%

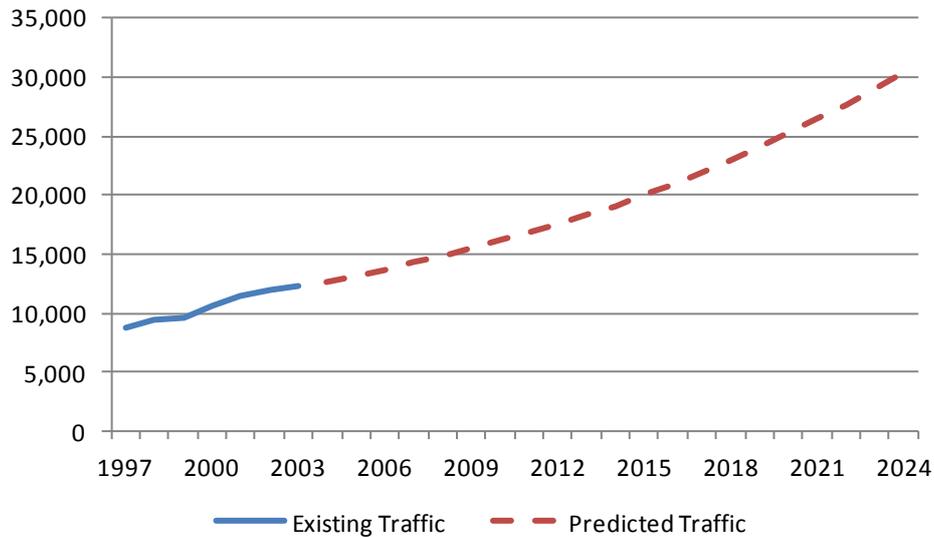
Source: M3 Clonee – North of Kells, Scheme Overview and General Information, Preliminary Design Report (Halcrow Barry, March 2002)

Figure 2.1 and Figure 2.2 show the actual traffic volumes on the old N3 corridor (using pre-existing NRA counters) up to 2003 and the predicted levels on the new M3. The traffic study shows a continued strong growth in traffic on the route indicating the scheme will attract a large proportion of the existing and new corridor traffic.

⁷ UK Treasury Taskforce "Policy Statement No. 2 – Public Sector Comparators and Value for Money" and "Technical Note No. 5 – How to Prepare a Public Sector Comparator"

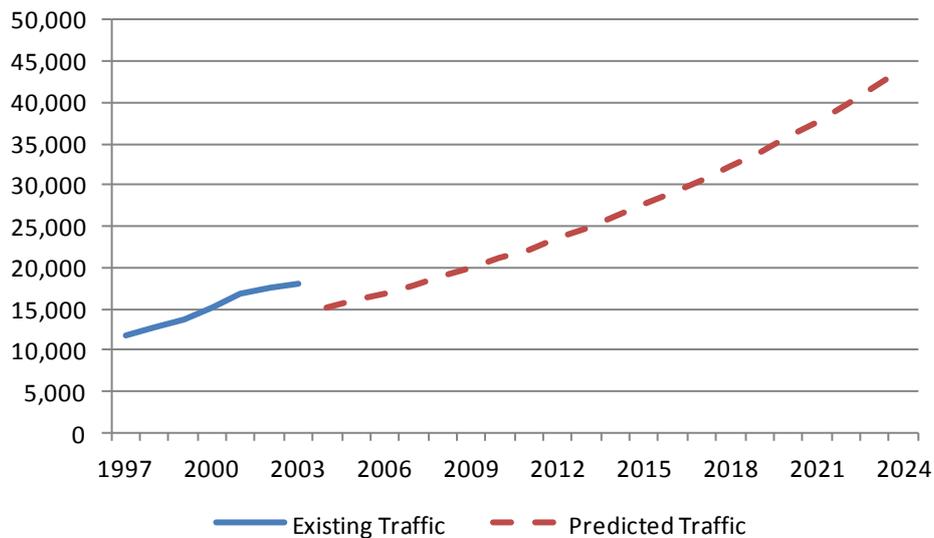
⁸ M3 Clonee – North of Kells, Scheme Overview and General Information, Preliminary Design Report (Halcrow Barry, March 2002)

Figure 2.1 : Existing Traffic Volumes (old N3) and Predicted Traffic (M3 tolled section) between Navan and Kells



Source: NRA traffic counters and traffic study predictions

Figure 2.2 : Actual Traffic Volumes (old N3) and Predicted Traffic (M3 un-tolled section) between Dunshaughlin and Blundelstown



Source: NRA traffic counters and traffic study predictions

Overall, the traffic studies forecast very strong traffic growth levels. An annual average growth rate in excess of 5% annually was predicted up to 2024. This is primarily based on the growth projections in the UCC studies (referenced previously) validated by the findings of a parallel study by Brady Shipman Martin⁹.

The annual average traffic growth on the N3 between 1997 and 2002 was 6% on the section between Navan and Kells and 8% on the section between Dunshaughlin and Blundelstown.

⁹ Development Outlook along the M3 Clonee to North of Kells Route Corridor (Brady Shipman Martin, September 2002)

An updated traffic study was carried out by Ove Arup and Partners in 2006 for submission to the oral hearing on the draft toll scheme in early 2007. This included the same levels of 2024 traffic as the original studies. In addition, it used actual traffic growth figures from 1999 to 2005 to validate that the growth in traffic predicted was being realised in the short term.

The traffic studies predicted the level of Heavy Goods Vehicle (HGV) traffic. The average HGV share of traffic volumes predicted ranges from 13% in 2004 to 11% in 2024.

Table 2.3 Forecast Heavy Goods Vehicle (HGV) Share of Traffic Volume

	2004	2024
Clonee-Dunboyne	11%	10%
Dunboyne-Dunshaughlin	11%	10%
Dunshaughlin-Blundelstown	11%	11%
Blundelstown-Navan South	15%	12%
Navan South-Navan North	20%	14%
Navan North-Kells	13%	12%
Average (weighted by traffic volumes)	13%	11%

Source: M3 Clonee – North of Kells, Scheme Overview and General Information, Preliminary Design Report (Halcrow Barry, March 2002)

2.3.4 Route Selection and Preliminary Design

The scheme was split into five sections for route selection purposes, namely:

- Clonee to Dunshaughlin;
- Dunshaughlin to Navan;
- Navan Bypass;
- Navan to Kells (including the N52 Kells Bypass); and
- Kells to North of Kells.

Constraints and route selection reporting progressed on a phased basis for both route corridors and alignments within these corridors. Evaluation was also carried out to select the preferred site for toll plazas.

A number of routes (ranging from five to ten) were examined for each section with the favoured route from each section joining to form the final corridor. The potential proximity of one section of the route to the Hill of Tara was a key consideration in route selection. Other principal drivers for the chosen corridor included:

- Impact on Natural Heritage Areas;
- Impact on areas of ecological importance;
- Impact on the visual landscape;
- Impact on residential dwellings;
- Impact on farms;
- Impact on community facilities and recreational areas;
- Length of route and number of bridges; and
- Accident reduction.

The preferred toll locations were chosen on the basis of the traffic study and local environmental considerations.

2.3.5 Project Appraisal

An economic evaluation of the scheme was undertaken in September 2001 by Halcrow Barry. The National Roads Authority produced Guidelines for Cost Benefit Analysis were used to adapt the

COBA application for use on the Irish road system. The results are contained in the Preliminary Design Report¹⁰.

A discount rate of 5% and a 30 year evaluation period from year of opening, assumed to be 2004, was examined. 1996 was the present value year used.

The output of the traffic studies (discussed above) was used as an input to the economic evaluation. This included the forecast Annual Average Daily Traffic (AADT) for each section of road between junctions.

The estimated cost of the scheme at 1996 prices was € 347 million, excluding VAT (including the costs associated with construction, land, property and design). The costs of the scheme were compared to the forecast benefits which included time savings, vehicle operating costs and accident savings. The results of the economic evaluation identified a Net Present Value of € 737 million. The Internal Rate of Return (IRR) is 12.3% and the Benefit to Cost Ratio (BCR) is 3.13.

A further economic appraisal was carried out in 2004 to assess the economic viability of constructing the scheme using a phased approach¹¹. This report found the principal effect of omitting some elements of the scheme would be a significant reduction in the level of benefits and overall rate of return.

This report had a number of differences from the original appraisal, namely: updated scheme costs, a revised opening year (from 2004 to 2008), use of the recently issued NRA COBA Guidelines which included revisions to data parameters and the evaluation at 2002 prices. The same traffic forecasts were used for the full scheme option.

The results of the 2001 appraisal and the full scheme from the 2004 appraisal are shown in Table 2.4.

Table 2.4 Results of Economic Evaluations (2002 Prices)

	2001 Appraisal (1996 Prices)	2004 Appraisal (2002 Prices)
Present Value of Benefits (€m)	1,083.5	2,902.5
Present Value of Costs (€m)	346.8	494.5
Net Present Value (€m)	736.7	2,408.0
IRR %	12.3%	19.9%
Benefit to Cost Ratio (BCR)	3.13	5.87

Source: M3 Clonee – North of Kells, Scheme Overview and General Information, Preliminary Design Report (Halcrow Barry, March 2002) and M3 Clonee to Carnaross Cost benefit analysis of Propose Scheme Options (Halcrow Barry, July 2004)

Both Cost Benefit Analyses demonstrate a very strong case in favour of the scheme. The primary difference between the two studies is an increase in scheme cost and a significant increase in benefits.

The COBA input and output files for the two economic appraisals were examined to better understand the differences between the two results. A portion of the increased levels are due to the later opening year rebasing at 2002 prices. The significant increase in benefits is primarily due to the changes in model inputs. Of particular note are the increased Value of Time levels in the 2004 study (based on the NRA guidance).

¹⁰ M3 Clonee – North of Kells, Scheme Overview and General Information, Preliminary Design Report (Halcrow Barry, March 2002)

¹¹ M3 Clonee to Carnaross Cost benefit analysis of Propose Scheme Options (Halcrow Barry, July 2004)

The proportion of vehicles in each category used in both studies is shown in Table 2.6 below. It shows that the economic appraisals assumed a 20% share of traffic for HGVs. This is well in excess of the 11% level predicted by the traffic studies. This raises concerns about the robustness of the economic appraisals.

Table 2.5 Vehicle Category Proportions used in Economic Appraisals

Car	Light Goods Vehicles (LGV)	Other Goods Vehicles (OGV)	Buses & Coaches (PSV)	HGV (OGV + PSV)
72%	8%	18%	2%	20%

Source: COBA input files for economic appraisals supplied by NRA

No sensitivity analysis on traffic levels or costs was carried out in either appraisal. In addition, the economic appraisal of the scheme was not re-visited at tendering stage, when revised costs estimates and up to date traffic forecasts associated with the scheme were available.

2.3.6 Compliance with Procurement, EIS and other Statutory Requirements

An Environmental Impact Statement (EIS) was prepared for the M3 Clonee to Kells Scheme in February 2002.

Procurement of the M3 Clonee to Kells Scheme was via a Public Private Partnership (PPP) arrangement advertised in the OJEU in April 2002. The preferred tender was selected in August 2005 and the contract signed in April 2007.

All of the above processes satisfied the statutory procedures in place at the time.

2.3.7 Adequacy of Consultation Processes

The proposed route of the M3 Clonee to Kells Scheme was chosen after extensive public consultation.

The consultations were advertised in the local and national press, on radio, display of notices in public venues and delivery of leaflets to households. The public consultation involved some four thousand people.

Following the selection of the Preferred Route, individual consultations took place with landowners directly impacted by the scheme. The design of the scheme was influenced by concerns raised by affected landowners.

The scheme was subject to an oral hearing by An Bord Pleanála which lasted 28 days. Approval was granted in August 2003.

2.4 Scheme Implementation

2.4.1 Scheme Management Structures

The preliminary design of the scheme was carried out in accordance with the Design Manual for Roads and Bridges applicable at that time.

2.4.2 Scheme Schedule, Management and Costs

The M3 Clonee to Kells Scheme was procured as a PPP. The scheme implementation in terms of the delivery of the scheme to the specification as set out in the PPP Contract, the management of the PPP Contract, the budget schedule, and the budget outturn are explored in detail in Section 5, where the performance of the scheme is reviewed in terms of anticipated outcomes.

2.5 Scheme Operational Performance

2.5.1 Traffic Outcomes on the New Road

The objectives of the scheme were to relieve traffic congestion in towns along the corridor such as Kells, Navan and Dunshaughlin, facilitate shorter travel times with associated cost savings, improve accessibility, contribute to a reduction of fatal accidents along the route and increase the potential for economic development.

The achievement of such objectives largely depends on the success of the scheme in attracting traffic to the scheme. In this context, the key question is whether the scheme has achieved the predicted level of traffic volumes.

The traffic study contains traffic predictions for 2004, 2014 and 2024 for the scheme. Interpolating between these dates yields the equivalent traffic predictions for the initial years of the scheme's operation.

Table 2.6 compares these predicted traffic levels with the actual volumes of traffic realised. It is seen that the shortfall in traffic is substantial with the scheme generally attracting on average 44% traffic less than predicted (and 55% less than predicted through the two toll plazas).

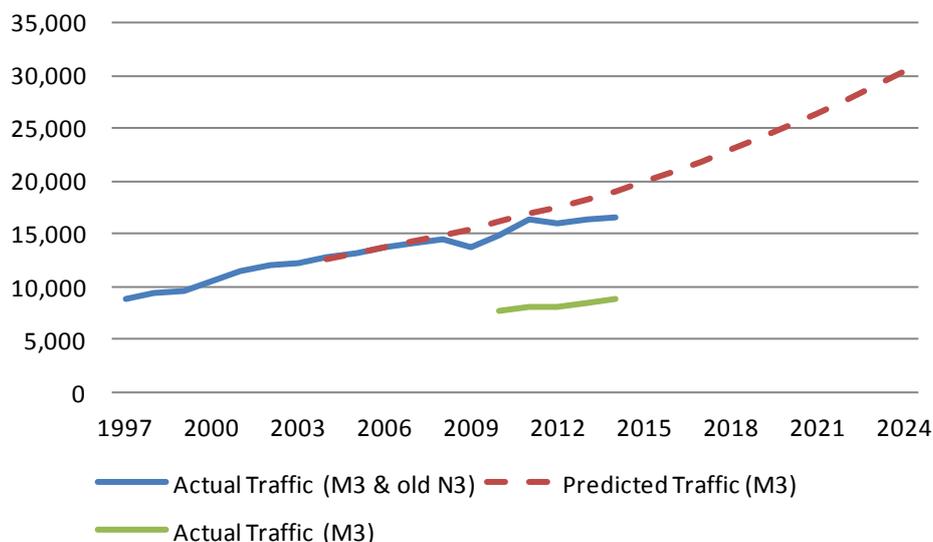
Table 2.6 Comparison of Forecast and Actual Traffic Volumes (AADT) for 2014 (to end of June)

	Traffic Study	Actual	Actual v Study
Clonee-Dunboyne	41,400	31,884	-23%
Dunboyne-Dunshaughlin*	33,200	14,896	-55%
Dunshaughlin-Blundelstown	26,200	14,805	-43%
Blundelstown-Navan South	35,300	13,466	-62%
Navan South-Navan North	14,600	11,321	-22%
Navan North-Kells*	19,100	8,842	-54%

*Tolled Sections

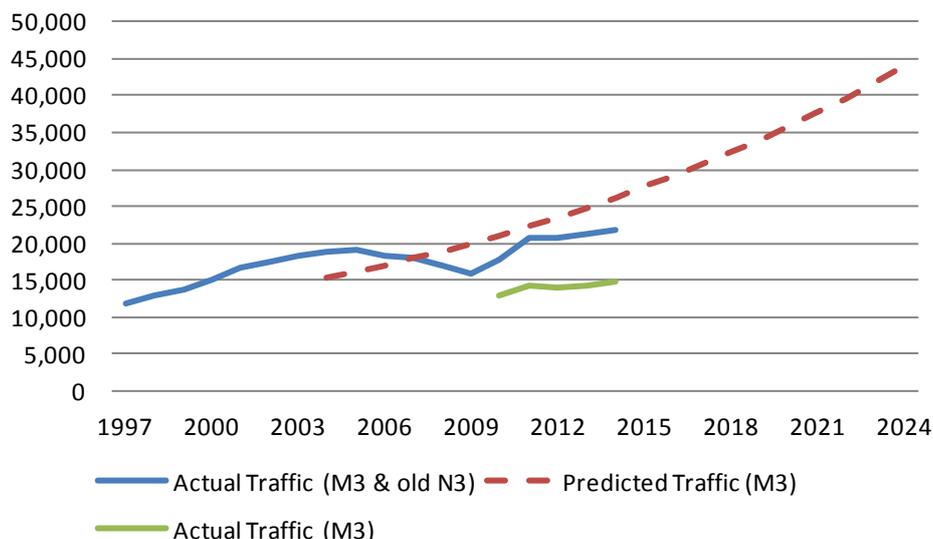
The traffic volumes along two sections of the M3 Clonee to Kells Scheme are examined in Figure 2.1 and Figure 2.2 below. The total corridor traffic for the old N3 prior to 2010 and the combined N3 and M3 from 2010 onwards is shown along with the predicted and actual levels of traffic on the M3.

Figure 2.3 Average Daily Traffic Volumes: Actual for M3 with/without old N3 and Predicted between Navan and Kells



Sources: M3 Clonee – North of Kells, Scheme Overview and General Information, Preliminary Design Report (Halcrow Barry, March 2002); NRA traffic data

Figure 2.4 Average Daily Traffic Volumes: Actual for M3 with/without old N3 and Predicted between Dunshaughlin and Blundelstown



Sources: M3 Clonee – North of Kells, Scheme Overview and General Information, Preliminary Design Report (Halcrow Barry, March 2002); NRA traffic data

The graphs above show the traffic on the M3 (green line) is well below the levels predicted (dashed line) for both sections.

The proportion of corridor traffic using the M3 on the Navan to Kells section is approximately 52%. This is well below the 86% level predicted in the traffic study.

It should also be noted that the level of traffic on the old N3 route has dropped by approximately 50% on the Navan to Kells route. This has resulted in less congestion and potentially faster journey times thus making the M3 option less attractive.

The proportion of corridor traffic using the M3 on the Dunshaughlin to Blundelstown section is approximately 68%. This is close to the 73% level predicted in the traffic study.

The corridor traffic (i.e. traffic on the M3 and old N3 combined) is below the levels predicted to use just the M3.

The experience to date would therefore point to overall lower traffic volumes than expected on the corridor and a higher than expected level of diversion to the old route on the tolled sections.

Table 2.7 examines the differences between the forecast share of HGV traffic using the scheme and the actual levels. It can be seen that the actual level is well below the forecast level. It is noticeable that the difference from forecast is greater for the overall scheme than for the tolled sections only. This is primarily due to the very high non-HGV usage on the Clonee to Dunboyne section.

Table 2.7 Forecast and Actual HGV Share of Traffic for Full Scheme and Tolled Sections Only

Year	Weighted Average		Tolls Only	
	Forecast	Actual	Forecast	Actual
2010	12%	7%	11%	8%
2011	12%	7%	11%	8%
2012	12%	7%	11%	8%
2013	12%	8%	11%	9%
2014	12%	8%	11%	9%

Sources: M3 Clonee – North of Kells, Scheme Overview and General Information, Preliminary Design Report (Halcrow Barry, March 2002); NRA traffic data

It should be noted that the economic appraisal used a higher value (20%) for the share of HGV traffic than forecast in the traffic report.

2.5.2 Road Safety Outcomes

One of the objectives associated with the scheme was a reduction in the level of fatal accidents along the route. Research has indicated that, historically, motorways have proved to be seven times safer than two lane roads in general and three times safer than dual carriageways¹².

In the period since the M3 Clonee to Kells Scheme opened in June 2010 to the end of 2012, there were three serious or fatal collisions on the scheme. There is a small reduction in serious and fatal collisions on the old route, most likely due to a reduction in traffic.

Given that only two full years of accident data is available, the effect of the scheme in reducing both serious and fatal collisions along the corridor is not yet clear.

¹² See: D O'Connell et al. Inter-urban Accident Rates by Road Type and Geometric Elements. Association of European Transport, 2004.

Table 2.8 Number of Serious and Fatal Collisions on New and Old Routes

	New M3		Old N3	
	Serious	Fatal	Serious	Fatal
2005	-	-	5	5
2006	-	-	8	4
2007	-	-	4	1
2008	-	-	4	2
2009	-	-	3	1
2010	0	1	2	1
2011	0	0	0	0
2012	1	1	3	3

Source: Road Safety Authority Collision Statistics

2.5.3 Overall Economic Return to the State

The M3 Clonee to Kells Scheme is likely to deliver on a number of its objectives including reduced congestion in towns along the old route and in the long-term contribute to a reduction in the number of fatal accidents along the route.

However, the significant shortfall in traffic volumes from the level forecast (circa 40%) raises serious questions over the economic return to the State. Although there was a strong economic return forecast (BCR of over 3), the differences in traffic volumes and cost on the operational scheme may not lead to a positive economic return from the scheme.

2.6 Summary

Since the opening of the M3 Clonee to Kells Scheme, reasonably large volumes of traffic have used the motorway, and it has contributed to a reduction in the volumes of traffic in the towns along the old N3 corridor and a reduction in overall traffic congestion.

The traffic volumes using the scheme to date are approximately 44% below the levels predicted (55% at the tolling locations). Such a reduction in traffic volumes over the lifetime of the scheme could negate the predicted net economic benefits.

The economic appraisals carried out were based on an unreasonably high proportion of heavy goods vehicles (HGVs) using the scheme. This raises further doubts about the economic merit of the scheme.

To date, the safety record of the bypass is moderately positive. It is believed the scheme will deliver safety benefits in the long-term.

Overall, the scheme was successfully planned and implemented. The preliminary design of the scheme was carried out in accordance with the Design Manual for Roads and Bridges applicable at that time.

Given the economic climate in Ireland during the scheme's first four years in operation, the performance is unlikely to be representative of the performance of the scheme over its full 45-year lifetime.

Nonetheless, given the significant shortfall in traffic volumes and the concerns over the economic appraisals carried out, it would be prudent to consider carrying out an updated traffic study and economic appraisal for the scheme. This would provide the basis for a more robust review of the project.

3 PPP Pre-Planning Review

3.1 Introduction

This section reviews the pre-planning steps completed by the NRA in progressing the M3 Clonee to Kells Scheme as a PPP.

3.2 Background

A PPP is a partnership between the public and the private sector for the purpose of delivering a project. There is a sharing of project risks between the public and private sectors. A PPP project benefits from an accelerated implementation through the availability of private sector funding. This is particularly the case in situations of limited public finances, where access to private sources of funding allows the progression of projects that would not otherwise be possible.

A number of guidance documents have been published by the authorities with responsibility for implementing PPPs, since the first PPPs were procured in Ireland over ten years ago. A summary of some of the key PPP guidance documents is provided in Appendix A. There are a number of planning steps recommended when considering a scheme as a potential PPP.

3.3 PPP Scheme Selection

The *National Development Plan (NDP), 2000 - 2006* confirmed the policy for PPPs on being the maximum usage of PPP consistent with the principles of efficiency and best value for money. Minimum targets for PPP private funding were included in the NDP, including 23% of the total €5.97 billion 2000 – 2006 road investment programme.

In mid-1999 the Government requested that the NRA examine a number of schemes to assess their potential as PPP schemes. The M3 Clonee to Kells Scheme was announced as part of the NRA's Tranche II PPP roads programme in June 2000.

The NRA established certain key principles to guide its PPP road scheme selection analysis. These principles were as follows:

- The use of the PPP mechanism would not delay scheme delivery;
- An alternative toll-free route should be available for road users;
- Tolloed roads should be spread across the main national routes to create an equitable distribution of user-charging on the country's newly constructed road network;
- A road project needed to be a minimum of £30 million (€38m) in value in order to produce value for money when using the PPP process; and
- A public subsidy would be considered for high cost schemes which could not be solely financed from tolls.

When examined in terms of these principles, the NRA determined that the M3 Clonee to Kells Scheme met the criteria as a potential PPP scheme.

3.4 Assessment of Shadow Bid Model

Prior to the commencement of the PPP tender process a Shadow Bid Model (SBM) was developed. The SBM included the following input information:

- Projected traffic and toll level information provided by the NRA's traffic advisors;
- Scheme costs provided by NRA and/or its technical advisers; and
- Financing assumptions in relation to debt, equity and economic assumptions.

The SBM was used to run a variety of financial scenarios which illustrated (or 'shadowed') how a private sector bidder might approach the scheme. The Shadow Bid Model is used to inform decisions in relation to the structuring of the transaction to be provided for in the tender requirement. An

overview of certain financial related tendering requirements as provided for in the M3 Clonee to Kells PPP Scheme tender invitation documents are set out in the table below.

Table 3.1 Tender Requirements

Key Features of M3 Clonee to Kells PPP Scheme Tender Requirements

- Construction and operational payments are available up to set limits and conditions
- Tenderers will be entitled to collect tolls for up to 30 years and are required to share a proportion of the toll revenue with the NRA based on traffic volumes. The option was available for tenderers to bid Variant Tenders up to a 45 year concession period.
- The Tenderer will be subject to non-availability payments which will be payable by the Tenderer to the NRA
- The Tenderer will not be permitted to generate excessive returns from the project and therefore bids must include a progressively increasing revenue share for the NRA as vehicle numbers increase.
- A traffic guarantee payment will be provided by the NRA in certain conditions

3.5 Value for Money (VFM) Assessment

The PPP planning guidance states that the decision to procure a project as a PPP should be based on a VFM assessment. This assessment compared the costs of procuring the scheme by traditional means (the Financial Comparator) with the equivalent costs of procuring the scheme by means of a PPP.

VFM comparisons were undertaken at various stages in order to ensure the continuing rationale for procuring the scheme through a PPP option. These stages are as follows:

- Following receipt of ITN Tenders;
- Following the receipt of an updated submission from the Provisional Preferred Tenderer; and
- Shortly before financial close (to reflect any material changes in the Provisional Preferred Tenderer)

A financial comparator was prepared as part of the Value for Money Assessment of the M3 Clonee to Kells Scheme, which identified the costs of procuring the scheme using a traditional procurement approach.

It should be noted that tenderers were required to make their own traffic forecasts. In most cases, these were significantly higher than the NRA's estimate. In carrying out the Value for Money assessments, the NRA's traffic estimates were used to forecast revenue share payments. Using the NRA's traffic forecasts ensured a sound basis for the VFM and allowed all tenders to be compared on an equal footing.

3.6 Preparation of the Financial Comparator

The Financial Comparator (FC) consists of an assessment of the total costs that would be incurred in the provision of a scheme through a traditional procurement scenario in which the public sector retains managerial responsibility and exposure to risk. In preparing the FC for the M3 Clonee to Kells Scheme, NRA Guidelines and Design Standards for road development were used, as was the experience in preparing previous Financial Comparators by the NRA's specialist advisors i.e. technical (Babtie Group) and financial (KPMG Corporate Finance).

As per the Guidance, the costs included in the FC were as follows:

- Base costs: the public sector's estimate of the costs it would incur to construct, maintain and manage the infrastructure for the duration and to the specification of the contract, before allowing for contingencies or risks.
- Retained risks: these risks, by their nature, always rest with the public sector;

- Risk retained under traditional procurement, but transferred under PPP: an allowance for the additional costs to the public sector as a consequence of the risks associated with the project.
- Efficiency adjustments: allows for the public sector improving its performance in managing base costs and the impact of risks over the life of the project.

As per the guidance, the FC was prepared prior to the receipt of ITN Tenders, to ensure it represented the NRA's best estimate of the cost of delivering the services required under the PPP scheme without being influenced by knowledge of the private sector's actual proposals.

3.7 Risk Assessment

In line with the Guidance, in preparing the FC, the risks capable of being quantified, that differed between the public and private sectors were assessed.

The approach to valuing of risk was based on a database of risk knowledge gained as part of the closing of six PPP deals, the preparation of nine financial comparators for previous PPP schemes, as well as information emerging from NRA schemes procured using Design and Build methods. The approach used was to assign a generic range of probabilities to each major risk category (Capital, Operational, Demand etc), on the basis of risk estimates from previous schemes. The probabilities were applied to the total cost estimates of each category to quantify the level of risk for the category as a whole.

Risks not amenable to quantification, but with the potential to influence the VFM assessment, were identified separately as part of the VFM assessment.

3.8 PPP Procurement Steps

Public Private Partnerships are a form of procurement and as such are subject to all the normal discipline applying to procurement generally, including Department of Finance procurement guidelines as well as EU Procurement Directives.

KPMG Corporate Finance, Jacobs Babbie and McCann Fitzgerald Solicitors provided advice to the NRA throughout the procurement process.

It is common in a procurement process to select two or more preferred tenderers and carry out a Best and Final Offer (BAFO) stage. Alternatively, a single tenderer can be selected as the Provisional Preferred Tenderer (PPT) to negotiate a contract with. In the case of this procurement procedure, a single tenderer was selected.

The procurement of the PPP scheme was conducted in an open and transparent manner, and in line with the relevant EU and national regulations.

3.9 Summary

The planning steps implemented by the NRA prior to procuring the M3 Clonee to Kells Scheme as a PPP were reviewed and found to be in line with the official PPP implementation guidance. The relevant steps advocated in the guidance documents were implemented by the NRA.

As set out in Section 2, the steps above would have been enhanced by the completion of a revised economic appraisal at the tendering stage. This would ensure explicit consideration would be given to updated cost/traffic projections relating to the scheme. As noted in Section 2, a revised CBA at the tendering stage now forms part of the NRA's Project Appraisal Guidelines, which addresses this shortcoming for all current/future schemes.

4 PPP Procurement Review

4.1 Introduction

This section includes a review of the VFM assessment undertaken to determine if the basis on which the decision was taken to procure the scheme as a PPP was appropriate.

4.2 Outcome of VFM Assessment

The VFM Assessment compared, over the lifetime of the scheme, the Net Present Value (NPV) of the Exchequer cash flows associated with the traditional procurement scenario, with the NPV of the Exchequer cash flows associated with the PPP procurement scenario. Table 4.1 sets out, in summary format, the NPV of the NRA and Exchequer costs and revenues associated with both procurement options.

Table 4.1 Summary of Exchequer Costs of the Scheme

NPV 000 €	Financial Comparator Traditional Procurement with tolling NPV	PPP Option Preferred Tenderer
Construction Costs	602.6	452.9
Lifecycle Costs	99.5	45.3
Operations & Maintenance Costs	175.5	185.9
Risk Pricing (excl Revenue Risk)	102.6	-
Funding Costs	-	123.6
Sub-Total of Costs	980.2	807.7
Toll Revenue	(619.3)	(651.7)
Total Net Scheme Cost Inputs (excl Revenue Risk)	360.9	156.0
VAT on Financial Comparator Costs*	143.7	-
Total Net Scheme Cost Inputs (incl VAT and excl Revenue Risk)	504.6	156.0
Retained Risks under PPP		12.8
Total Cost to the NRA (excl Revenue Risk)	504.6	168.8
Less incremental cash flows to Public Sector	(143.7)	(114.1)
Net Cost to the Public Sector	360.9	54.7

Source: Value for Money Assessment, M3 Clonee to Kells Scheme, May 2005

The NPV cost to the NRA is therefore €361 million under traditional procurement and €156 million under the PPP Option.

When the net cost to the Public Sector (including risks) are examined, there were estimated net costs associated with the PPP option, totalling €55 million, compared to an estimated cost of traditional procurement totalling €361 million, a difference of circa €306 million.

There was an additional estimate of €179.7 million (NPV) associated with revenue risk. This related primarily to the ability of the public sector to achieve an annual increase in toll charges in line with CPI. When an adjustment is made for revenue related risks, the traditional procurement cost is almost €500 million greater than the PPP cost.

The higher estimated public sector costs associated with the (tolled) Financial Comparator option relative to the PPP option resulted in the decision being taken to procure the scheme as a PPP.

A key reason for the significant difference between the traditional procurement and PPP option is the level of traffic predicted to use the scheme and its growth over the lifetime.

Table 4.2 shows the traffic forecasts used by the NRA and PPP Concessionaire. It can be seen that the level of growth predicted under the median forecast by the PPP Concessionaire is well in excess of the level used by the NRA in assessing both the traditional procurement and PPP options.

Table 4.2 Forecasts of Traffic Growth and Levels by NRA and PPP Concessionaire

	2010-2041	2010-2051	2041	2051
NRA Medium Traffic Growth	2.53%	2.02%	75,883	79,367
PPP Concessionaire Medium Traffic Growth	3.50%	3.07%	93,977	112,116

Source: M3 Clonee to Kells Scheme ITN Stage VFM Analysis (May 2005)

The levels forecast by the PPP Concessionaire are 24% higher in 2041 and 41% higher in 2051.

The traffic forecasts were used by the PPP Concessionaire to generate the capital cost and operational cost element of their tender. As part of the VFM process, the NRA traffic forecasts (as opposed to those of the PPP Concessionaire) were used to estimate potential revenue shares and traffic guarantee payments.

Therefore the higher traffic forecasts used by the PPP Concessionaire in compiling the capital and operational payments explain the significant benefit in selecting the PPP option.

The traffic forecasts used in the Value for Money (VFM) analysis are more conservative than predicted in the traffic study. The medium forecast level is approximately 20% lower than the traffic study in the early years of the scheme. It is assumed this was a level of conservatism employed for the VFM assessment.

Table 4.3 Traffic Forecasts for Both Tolling Locations Combined from Traffic Study and used in Value for Money Analysis

Year	Traffic Study	VFM		
		Low	Medium	High
2010	43,388	32,748	35,023	38,525
2011	45,461	33,387	35,908	39,498
2012	47,635	34,039	36,814	40,495
2013	49,912	34,704	37,744	41,518
2014	52,300	35,381	38,697	42,567

Sources: M3 Clonee – North of Kells, Scheme Overview and General Information, Preliminary Design Report (Halcrow Barry, March 2002); M3 Clonee to Kells Scheme ITN Stage VFM Analysis (May 2005)

The actual traffic volumes passing through the two tolling locations combined are approximately 40% lower than the Value for Money medium level forecast and approximately 35% below the low level forecast.

Given the PPP Concessionaire was assuming a proportion of the traffic risk and under the traditional procurement method the entire traffic risk was with the public sector, the traditional procurement method costs would be higher due to the lower traffic levels. Under the PPP option part of the traffic risk was transferred to the private sector. The following section includes a detailed comparison between the traffic levels used in the VFM assessment and the actual traffic levels realised on the scheme to date.

4.3 Review of Components of Financial Comparator

A detailed review was undertaken to determine if the individual cost and revenue items included in the Financial Comparator and PPP options represent accurate approximations of the costs and revenues attributable to the Exchequer under each procurement option. Full details of this review are included in Appendix B which can be summarised as follows:

- The total costs used in the Financial Comparator are 16% higher than the average total cost from the four tenders at ITN stage based on a 30 year project life and 9% higher based on a 45 year life;
- The risk values associated with the FC scenario revealed that the cost risk values of €127 million (13% of total costs) are lower than expected¹³; and
- Traffic volumes are significantly below the forecasts used to estimate Toll Revenue. A risk adjustment of €180 million was included in the VfM. During the initial years since the scheme opened, the shortfall in traffic volumes (circa 40%) exceeds the risk adjustment estimated (circa 35%).

4.4 Summary

The NRA's decision to procure the M3 Clonee to Kells Scheme as a PPP was based on a VFM Assessment. The results of the VFM assessment showed there were higher NRA costs to the order of €300 million associated with the Financial Comparator relative to the PPP option, which resulted in the decision being taken to procure the scheme as a PPP. When revenue risk associated with the traditional procurement method is included the cost differential increased to almost € 500 million.

Following a detailed review of the components of the VFM assessment, it was determined that the net cost of the Financial Comparator was underestimated. This is due to the significantly lower levels of traffic realised on the scheme once built.

The traffic volumes seen on the scheme to date are approximately 40% below the levels used in the VFM measured at the tolling points.

The lower level of traffic impacts both the potential revenue share and potential traffic guarantee payments.

This is critical in determining if the decision to procure the scheme as a PPP represented value for money for the Exchequer and was the appropriate decision for the scheme and is examined further detail in the following section.

¹³ Other PPP Schemes had levels ranging from 20-25%

5 PPP Scheme Implementation Review

5.1 Introduction

This section reviews the implementation of the M3 Clonee to Kells Scheme to date. The scheme's implementation is reviewed across three key criteria, as follows:

- **Timing:** A review of the time taken to complete the various stages of the scheme
- **Quality:** An analysis of whether the key elements of the scheme as per the project specification were achieved; and
- **Costs and Revenues/Traffic Volumes:** an analysis of the public sector costs associated with PPP scheme relative to initial estimates.

5.2 Timing of PPP Scheme Implementation

As part of its 2000 Best Practice Guidelines, the Department of the Taoiseach (DOT) stated that a PPP approach should be adopted wherever it would “*accelerate the implementation of a particular project*”. In the Framework for Public Private Partnerships - Working Together for Quality Public Service, published by the Social Partners in 2000, the principles underpinning the PPP programme were set out, including: “*PPPs should maximise the benefits of private sector efficiency, expertise, flexibility and innovation*”.

Table 5.1 and Table 5.2 set out the procurement and construction periods associated with the M3 Clonee to Kells PPP Scheme.

Table 5.1 Procurement Timelines

Date	Task
Pre Qualification	
April 2002	OJEU Notice
ITN Tender Phase	
August 2004	Tender Invitation Documents Issued
January 2005	Submission of Tenders for Short Listing
Preferred Tenderer Phase	
August 2005	Preferred Tenderer Selected
April 2007	Contract Award
Road Opening	
June 2010	Road Opening

Source: NRA

Table 5.2 M3 Clonee to Kells PPP Scheme Timelines

	No of Months
Start Procurement - end Procurement	60
Start Construction - end Construction	38
Start Procurement - end Construction	98

The procurement period, from date of first issue of the OJEU notice to contract award to the successful PPP bidder, totalled five years. The PPP contract was awarded to the successful bidder in April 2007. The motorway scheme was opened 38 months later, in June 2010.

It was not possible to identify equivalent procurement and construction timeframes for roads of a similar scale to the M3 Clonee to Kells PPP Scheme¹⁴. As such, the review of the scheme's timeliness is restricted to a review of the targets set for the scheme. The motorway scheme was scheduled to be complete in August 2010. The actual motorway opening took place in June 2010 almost two months ahead of schedule.

5.3 Quality of PPP Scheme Implementation

In reviewing the PPP scheme's implementation, a number of key areas were reviewed:

- the delivery of the scheme to the specification of the PPP contract;
- the management procedures put in place by the NRA; and
- the contract management in the design, construction and operational phases.

5.3.1 Delivery of Key Element of the Scheme

The M3 Clonee to Kells PPP Scheme was delivered in line with the contract specification. There have been no issues relating to the quality of the scheme post completion that have not been addressed speedily by the concessionaire, in line with the terms of the contract.

5.3.2 PPP Management by the NRA

The progression of the scheme was managed by a newly established PPP unit within the NRA. In line with published guidance, the NRA contracted legal, financial and technical advisers to assist with:

- the devising of an appropriate procurement mechanism;
- the drawing up of detailed contract documents; and
- assessing and selecting PPP consortia for the scheme.

To date, the management of the PPP scheme contract has run smoothly. The PPP Concessionaire, in line with its obligations, has provided the NRA with its reporting requirements, including: Winter maintenance reports; Annual reports; Annual performance reports; five yearly management plans; and Monthly O&M reports.

5.3.3 Contract Management during Design and Construction

The NRA contracted technical engineers to project manage the design and construction of the scheme on its behalf. Over the course of the construction period, the NRA was provided with a monthly construction period report.

5.3.4 Contract Management during Operation

The NRA's management of the operational phase of the PPP contract has operated on the same basis as the design and construction phase, namely technical support has been contracted in as required. NRA staff members are allocated supervisory roles for individual PPP schemes. As part of this supervisory role, the NRA staff member is responsible for reviewing the reports provided by the PPP Concessionaire, making on-sites visits to the scheme and administering the contract.

¹⁴ Such a comparison would be possible if the schemes in the PPP programme were compared to a sample of similar non PPP road schemes.

5.4 Outturn Cost of PPP Scheme

One of the key principles underpinning the implementation of PPP infrastructure projects in Ireland is the obtaining of better Value for Money for the NRA and the Exchequer. The Department of Finance PPP Implementation guidance (see Appendix A) stated that Ex-Post Reviews of PPP Schemes should contain a comparison of the actual PPP outturn costs (as provided for in the PPP contract¹⁵) with the initial estimated costs of the scheme (as set out in the Financial Comparator).

The actual PPP outturn cost to the Exchequer is identified in the PPP contract and as such, the PPP outturn cost remains unchanged except where:

- any variation costs are potentially introduced after financial close; and/or
- the revenue share/royalty payments payable from the PPP scheme are different to those estimated in the tender evaluation process.

The estimated NRA costs associated with the preferred PPP option totalled a net cost of €169 million (see Table 4.1).

Arising from various variations relating to the works requirements, additional payments were made to the consortium for contract variations which amounted to €27 million. The main contract variations that arose were a change in national policy which saw the road type change to Type 2 (2+2) dual carriageway from a type 3 (2+1) carriageway which impacted 10 km of the scheme, changes in local and national pavement and other design specifications, additional accommodation works and a reduction in the lands made available for construction.

Since the signing of the PPP contract, there have been no revenue share payments arising from the PPP scheme. This is as expected.

Due to the low level of traffic on the scheme, there have been traffic guarantee payments totalling €7.5 million made to the PPP Concessionaire for the period from October 2010 to December 2013. These payments are likely to continue into the future.

5.4.1 Traffic Levels

The traffic levels using the scheme since opening have been well below the levels predicted in the traffic studies and the levels used by the NRA in carrying out the Value for Money (VFM) assessment.

In fact, the traffic levels have been so low as to trigger the payment from the NRA to the PPP Concessionaire under the traffic guarantee.

The shortfall in traffic levels is shown diagrammatically in Figure 5.1 and in tabular form in Table 5.3.

¹⁵ The actual costs incurred by the PPP Concessionaire in providing the infrastructure and services as per the specification incorporated into PPP contract is unknown, because the Concessionaire is not required to provide this information to the NRA. The outturn cost data that is available relates to the estimated outturn NRA costs associated with the PPP Contract, as signed by the Concessionaire at Financial Close. This cost estimate incorporates any agreed contributions to construction and operational costs payable by the NRA to the Concessionaire less any revenue share/royalty payments payable to the NRA.

Figure 5.1 : Actual Traffic Levels Compared to Forecasts, Traffic Guarantee and Revenue Share Limit

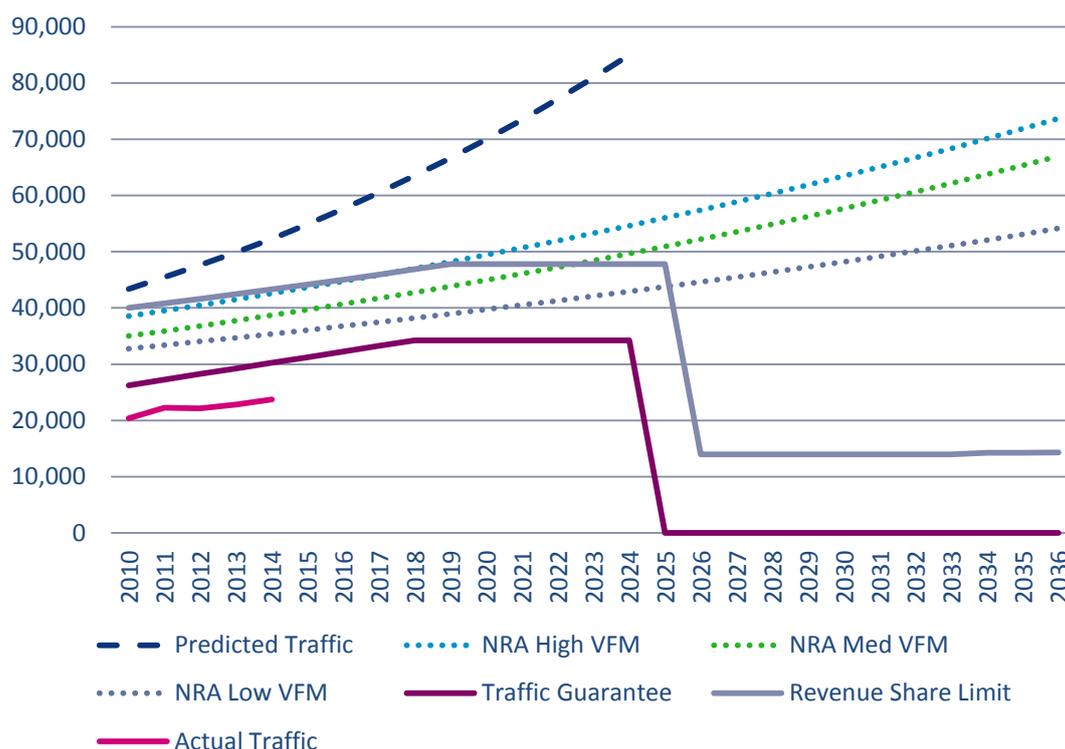


Table 5.3 Forecast NRA and Actual Traffic Volumes (at tolling points combined)

Year	Low	Medium	High	Actual Traffic	% Difference Actual v Med
2010	32,748	35,023	38,525	20,405	-42%
2011	33,615	36,341	39,975	22,233	-39%
2012	34,483	37,659	41,425	22,168	-41%
2013	35,350	38,977	42,875	22,826	-41%
2014	36,217	40,295	44,324	24,667	-39%

Source: M3 Clonee to North of Kells Scheme, Tender Evaluation – Final Report (May, 2005)

As Table 5.3 highlights, traffic volumes at the tolling points have been approximately 40% below the medium level traffic forecasts (used in the Value for Money analysis) since the opening of the M3 Clonee to Kells in June 2010.

The VFM assessment estimated 7.1% of traffic would be heavy goods vehicles (HGVs). Since opening, the M3 Clonee to Kells Scheme has seen heavy vehicles share slightly exceeding this level.

Table 5.4 Heavy Goods Vehicles (HGVs) as a Proportion of all Vehicles

Year	Heavy Goods Vehicles (HGV) as a Proportion of all Vehicles
VFM	7.10%
2010 Actual	7.59%
2011 Actual	7.86%
2012 Actual	7.94%
2013 Actual	8.61%

Source: NRA

5.4.2 Revenue Share Payments

The traffic volumes in the initial years of the motorway opening have resulted in no revenue share payments being made to the NRA. This is as expected.

Under the VfM assessment there were substantial revenue share payments expected in future years totalling € 267 million in NPV terms (2005). The full realisation of this €267 million is unlikely given the lower levels of traffic. Nonetheless revenue share payments are expected to begin in 2025 in line with the original forecasts.

The level of revenue is forecast to be of the order of 70%¹⁶ lower than originally forecasts based on current traffic figures over the lifetime of the PPP Concessionaire. It should be noted that this is an approximation using general traffic growth predictions. As such this estimate should be treated with suitable caution.

5.4.3 Implications for Total Outturn Cost associated with PPP Option

As set out above, initial traffic levels using the M3 motorway have been significantly below the levels forecast as part of the Value for Money assessment process. The growth assumptions used in the VFM are examined against current NRA guidance (published in 2011) in Table 5.5 below.

Table 5.5 Growth Assumptions Used in Value for Money (VFM) and Current Guidelines

	2010-2025		2026-2040		2041-2051	
	PAG	VFM	PAG	VFM	PAG	VFM
Low	0.86%	1.95%	0.74%	1.95%	0.00%	0.45%
Medium	1.07%	2.53%	0.83%	2.53%	0.00%	0.45%
High	1.97%	2.53%	1.42%	2.53%	0.00%	0.45%

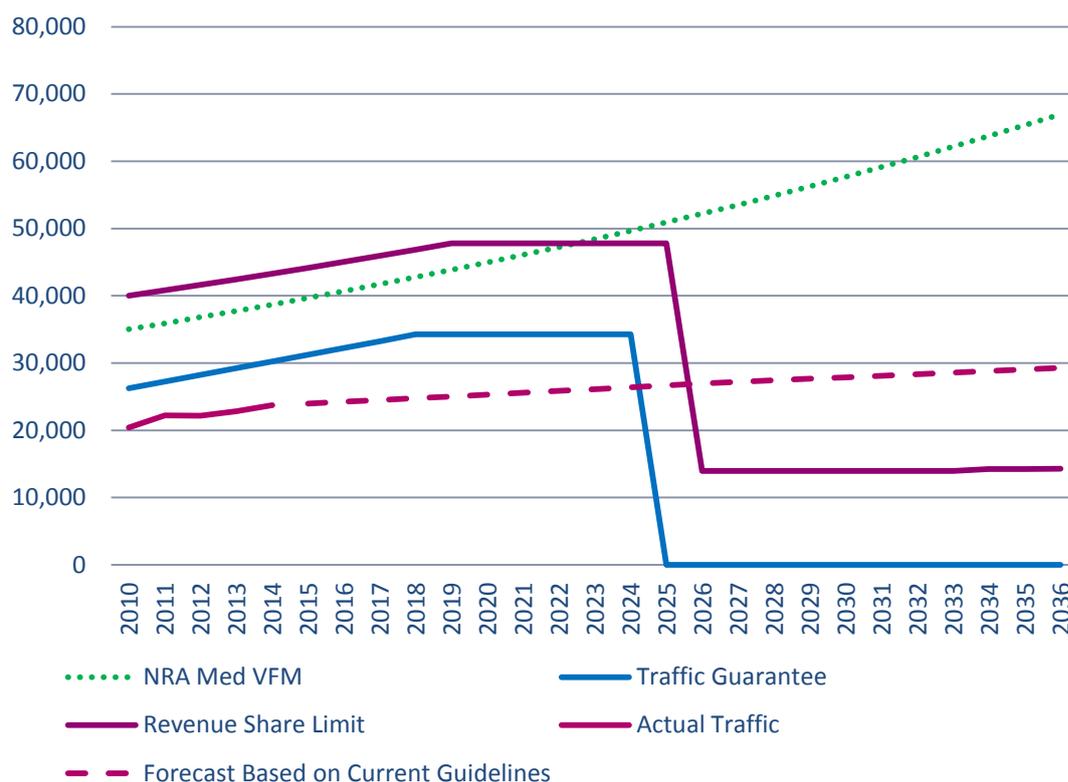
Source: Tender Evaluation Final Report, M3 Clonee to Kells, May 2005 and NRA Project Appraisal Guidelines (PAG), Unit 5.5 Link-Based Traffic Growth Forecasting (January 2011) Assumes 9% of traffic are Heavy Vehicles

It is clear that the growth rates used in the VFM process are higher than the current NRA guidance for the East region in which the scheme is located.

The traffic levels have been forecast using the traffic volumes in 2013 and the current NRA Project Appraisal Guidelines for medium traffic growth. The results are shown in Figure 5.2.

¹⁶ Estimate based on reduction in predicted traffic volumes from levels used in VfM evaluation

Figure 5.2 : Forecast Traffic Levels Using Current (2011) Guidance



It is seen in Figure 5.2 above that the NRA medium forecast (green dotted line) was always above the level at which the traffic guarantee would apply. The actual traffic using the scheme is below the level at which traffic guarantee payments must be made by the NRA to the PPP Concessionaire. These are expected to continue until circa 2025 at which point the traffic guarantee level drops to zero. This reduction in the level of traffic guarantee is related to repayment of senior debt by the PPP Concessionaire.

It can also be seen that the NRA medium forecast level of traffic would imply revenue share payments commencing in approximately 2023. These are not likely to commence before 2026 and when they do, will be at a lower level than predicted in the VFM.

In order to evaluate if the decision to procure the scheme as a PPP as opposed to traditional procurement was correct, the Net Cost to the Public Sector (in Table 4.1) must be adjusted as follows:

- The cost of the Traditional Procurement option to increase by the shortfall in toll revenue (circa 40% of €619 million in NPV terms)
- The cost of the PPP option to increase by the level of lost revenue share (circa 70% of € 267 million in NPV terms)
- The cost of the PPP option to increase by the level of traffic guarantee payments that will be made (estimated at €30 million over the course of the PPP concession which is circa €23 million in NPV terms)¹⁷

¹⁷ Source: NRA

Table 5.6 Revised Net Cost Benefit of Decision to Procure as a PPP Scheme

Description	NPV (€m)
Net Cost Benefit to the Public Sector (VfM)	306
<i>Add increases in Traditional Procurement Cost</i>	
Reduction in Toll Revenues (40% of €619m)	248
<i>Less increases in PPP Cost</i>	
Traffic Guarantee	23
Reduction in Revenue Share (70% of €267m)	187
Revised Net Cost Benefit to the Public Sector (VfM)	344

Estimates based on current traffic levels

The difference of €306 million between traditional procurement and PPP is forecast to increase to approximately €344 million.

Although the NRA may receive reduced revenue share payments and will make traffic guarantee payments, a large proportion of risk (and cost) associated with the levels of traffic using the scheme remains with the PPP Concessionaire. Under the Traditional Procurement method, this risk (and cost) would remain entirely with the NRA. This would be seen in reduced toll revenues.

Based on the information currently available, it can be concluded that the decision to procure the project as a PPP was a reasonable decision.

Given the level of traffic using the scheme is so significantly different from the levels predicted, it may be considered prudent to carry out a revised traffic study in order to carry out further analysis of the project.

5.5 Summary

The M3 Clonee to Kells Scheme's implementation was reviewed in terms of the timing of the scheme, the quality achieved by the scheme and the actual materialised costs of the scheme against initial estimates.

The construction of the scheme commenced in April 2007 and the scheme opened in June 2010, two months ahead of schedule.

The scheme was delivered in line with the specification set out in the concession contract. There have been no substantial issues relating to the quality of the scheme post completion that have not been addressed by the concessionaire, to an acceptable standard.

Since the opening of the M3 Clonee to Kells Scheme, the traffic volumes using the motorway have been significantly lower (circa 40%) than those forecast as part of the VfM assessment process. As expected, there have been no revenue share payments.

Having regard to the shortfall in traffic volumes, the revenue share payments to the NRA will be much reduced over the lifetime of the scheme. In addition, traffic guarantee payments will be made from the NRA to the PPP Concessionaire for a portion of the life of the project.

However, due to the PPP Concessionaire assuming a large share of the risk (and cost) associated with low traffic levels using the scheme, the net cost of the scheme would be higher under traditional procurement. Therefore the decision to procure the scheme under the PPP option is justified.

The shortfall in traffic is so great it is advised that an updated traffic study is carried out in order to use a more accurate forecast of future traffic in order to assess the decision to procure the project as a PPP.

6 Summary and Conclusions

In general, the M3 Clonee to Kells Scheme was adequately planned both in terms of the statutory procedures, route selection, consultation and the planning undertaken in relation to the decision to procure the scheme as a Public Private Partnership (PPP).

During the implementation of the scheme, the appropriate management procedures adopted were satisfactory and in line with best practice guidance at the time. The implementation of the scheme as a PPP resulted in the scheme being delivered ahead of schedule and in line with the quality specified in the PPP contract.

The scheme has delivered on many of its objectives with the resultant benefits and outcomes. The scheme has helped to reduce traffic volumes and congestion in towns along the old N3 route and is likely to reduce the numbers of fatal accidents along the corridor over its lifetime.

The economic appraisals that were carried out were three years prior to the contract being awarded and over six years prior to the scheme opening. There was no re-appraisal to account for changes in cost and traffic forecasts. The traffic forecasts that were used in the economic appraisal were significantly higher than the actual volumes that use the scheme (44% for the full scheme and 55% at the tolling points). In addition, the share of Heavy Goods Vehicles (HGVs) used in the economic appraisal was unreasonably high.

Given the lower than expected level of traffic using the scheme, it is possible that the scheme may have a net economic cost over its lifetime. However, due to the issues identified with the original economic appraisals, it is not possible to make an assessment of the economic value of the scheme based on these appraisals.

A value for money (VFM) study was carried out prior to awarding the contract. This included a comparison of traditional procurement with Public Private Partnership (PPP). This study estimated a reduction in risk adjusted costs to the public sector of approximately €300 million compared to traditional procurement (increasing to almost €500 when the revenue risk associated with traditional procurement is included).

As the level of traffic using the scheme is substantially below the levels forecast (circa 40% at the tolling points), the NRA will receive substantially reduced revenue share payments and make payments under a traffic guarantee provision to the PPP Concessionaire.

Nonetheless, the decision to procure the scheme as a PPP appears to be justified for two reasons. The high level of traffic assumed by the PPP Concessionaire led to lower capital and operational payments from the NRA over the course of the project than would be the case under traditional procurement. In addition, the PPP Concessionaire maintains a proportion of the cost associated with the reduced levels of traffic all of which would fall on the NRA under traditional procurement.

Given the concerns over the economic appraisal carried out, and having regard to the shortfall in traffic volumes from those predicted it would be advisable to undertake a new traffic study and updated economic appraisal of the scheme based on the best available current information. This would allow a more comprehensive assessment of the scheme to be carried out and provide a benchmark to measure future performance against.

Appendix A: Overview of PPP Guidance

Developing the Infrastructure Requirements of the National Development Plan: Best Practice Guidelines for Project Implementation, Department of the Taoiseach, 2000

As part of its 2000 Best Practice Guidelines, the Department of the Taoiseach (DOT) stated that a public private partnership approach should be adopted wherever it would accelerate the implementation of a particular project and represent better value for money over the full life cycle of the project. The DOT also stated that the most appropriate form of PPP (ranging from design and build to design, build, finance and operate) should be adopted having regard to the particular circumstances of the individual project.

Framework for Public Private Partnerships, Working together for Quality Public service. 2000

In 2000, a framework document endorsed by IBEC, ICTU, CIF, the Department of Finance and the Departments and Agencies engaged in the PPP process was published by the Social Partners. In the Framework a clear statements of the principles underpinning the PPP programme were set out, namely:

- PPPs should yield value for money for the Exchequer;
- PPPs should allocate risks to the party best able to control and manage them; and
- PPPs should maximise the benefits of private sector efficiency, expertise, flexibility and innovation.

A Policy Framework for Public Private Partnerships (PWC), DOEH&LG 2000

In 2000, the then Department of Environment, Heritage and Local Government commissioned PWC to produce a framework within which PPP projects could be advanced in the roads, water and waste sectors. The resultant Policy Framework detailed policy guidance covering each stage in the development, implementation and management of PPP projects. Some of the key guidance points identified in the resulting policy framework document include:

- **Market soundings** should be undertaken to determine the level of interest among the private sector and the capability of the private sector market to undertake prospective PPP projects.
- An **Output Specification** should be prepared which defines the services required by the public sector which the private sector would be responsible for providing as part of a PPP project. The actual design of the works necessary to deliver that service would be left to the successful private sector tenderer.
- A key driver of the PPP programme is the desire to increase **Value for Money (VFM)** in infrastructure procurement. To ensure that value for money is achieved, the Contracting Authority should be able to demonstrate that the option selected offers better value for money than the alternatives. The VFM assessment should not be seen as a single step but one that is carried through the life of the project. An initial PPP Assessment should be completed at the Option Appraisal stage to determine the potential for a PPP to deliver improved value for money compared with a traditional procurement. The final VFM assessment can only be made at the conclusion of the procurement process.
- In the case of projects where the public sector is the sole or main purchaser, the VFM undertaken at the end of the procurement process should comprise two key elements:
 - Monetary comparison – a comparison of the cost of the preferred Public Private Partnership tender, with the cost of traditional public sector procurement (the Financial Comparator), expressed in terms of discounted cashflows over the life of the PPP contract; and
 - Non-monetary comparison – a comparison of all the factors that are difficult to quantify in monetary terms, but their value to government and the wider public is significant. Examples include speed of project delivery, quality of service, and security of supply.
- One of the principles underlying PPPs is that risk should be allocated to the party best able to manage it. A detailed **risk assessment** should be undertaken for every PPP project.

- Central and Contracting Authorities will need to retain legal and financial advisers, as well as technical specialists, especially for Design, Build, Operate and Finance contracts and Concession contracts.

Policy Framework for Public Private Partnership (PPP) in Ireland: Project Implementation in the Local Government Sector, DOEHLG, Nov 2003

In 2003, the then Department of Environment, Heritage and Local Government published a policy framework document to guide the local government sector in the implementation of PPPs. The guidance highlighted the steps which all public projects must follow to ensure that the projects are properly examined and assessed, that the necessary statutory and administrative approvals are obtained, and that the procurement process is carried out in an efficient manner. It also highlighted the PPP specific tasks in relation to those steps, as follows:

- Project Identification – on the basis of an established business case/need for a project, the project receives the approval of a Sanctioning Authority. If a PPP approach is being considered some **market soundings** may be carried out to establish if there is market interest in the project.
- Option appraisal – during this phase various options for carrying out the project are examined, if the preferred option is a PPP, a PPP assessment report is completed which: determines the form the PPP will take; and establishes the **optimum allocation of risk** between public and private sector. Stakeholder consultation is carried out as part of a PPP Assessment Report. If the PPP procurement route is chosen, Department approval is sought before a Project Auditor is chosen, external advisors appointed, and a project steering group established.
- Statutory processes – the LA is responsible for preparing the project to go to procurement, including ensuring that the various planning and land acquisition and access consents are obtained.
- Pre-procurement - a **Public Service Benchmark (PSB)** cost is prepared, Departmental approval is sought for the project to go to procurement and an affordability cap is set based on the PSB.
- Procurement – the project is taken through the procurement process, when completed a tender recommendation report is submitted, and Departmental approval is sought to go to construction.
- Construction and operation – the contractor commences construction, variations may need to be referred to Department. When the LA is satisfied with the infrastructure provided, it signs off on the project and the operational contract commences.
- **Review of the PPP Process** – the performance of the project is reviewed
- Expiry of Contract

The Review of the PPP Process refers to the review of the performance of the project. As part of the policy framework document, the DOEHLG identified the objectives associated with the post project review of PPPs as follows:

- provide data on costs as an input to assessments (Public Sector Benchmarks) of subsequent PPP projects;
- provide public authorities with information on the economic benefits, or otherwise, of the PPP approach over alternative procurement approaches;
- identify the strengths and weaknesses in the systems in place for managing PPP projects.

It was noted that the Review of PPPs should contain the following:

- a brief description of the project;
- an outline of the project history with key decisions /events highlighted;
- a variance analysis of the final outturn costs of the project compared against initial estimates, the PSB, Affordability Cap and the Final Contract price;

- an analysis of the time taken to complete different stages of the project compared with projections; and
- the extraction of selected costs for the Department's database of costs on PPP projects.

Guidelines for the Provision of Infrastructure and Capital Investments through Public Private Partnerships: Procedures for the Assessment, Approval, Audit, and Procurement of Projects, 2006, Department of Finance

The Department of Finance (DOF) 2006 Guidelines for the Provision of Infrastructure and Capital Investments through Public Private Partnerships replaced Interim Guidelines published by the DOF in July 2003. The 2006 DOF Guidelines identified four distinct strands or functions associated with PPP projects as follows: the project appraisal function, the approval function, the procurement function and the audit function. Best practice would require an appropriate separation of functions between these strands.

1. The Sponsoring Agency is responsible for appraising projects. As part of the Detailed Appraisal, the Sponsoring Agency should determine the most appropriate procurement mechanism and, if a PPP approach is being considered, a PPP Procurement Assessment should be carried out.
2. Following appraisal of the proposed project, the Sponsoring Agency should approach the Sanctioning Authority for approval to proceed with the procurement of the project as a PPP.
3. PPP projects must be procured in line with all regulatory and EU procurement requirements in regard to tendering and bid evaluation.
4. There is a particular audit requirement in regard to PPP which is additional to the requirements outlined in the *Capital Appraisal Guidelines*, i.e. the appointment of a Process Auditor. A Process Auditor must be appointed for all PPP projects or grouped PPP projects where the capital cost is in excess of, or is likely to exceed, the limit specified by the Department of Finance (then €20 million).

Some of the key guidance points identified in the DOF 2006 Guidelines include:

- **Affordability:** A Sanctioning Authority should not allow a project to proceed unless it is satisfied that the overall capital cost of the project as a whole, including both PPP and non-PPP elements, can be accommodated within the Capital Envelope allocation(s) available to the Sponsoring Agency.
- **Value for Money:** VFM needs to be considered at two levels:
 - The overall VFM of the project – i.e. does the project as a whole offer good value for money; and
 - The VFM of the PPP contract – i.e. do the aspects of the project that are being procured by PPP represent good value for money, particularly when compared with the cost of achieving the same objective by traditional procurement (as represented by the Public Sector Benchmark (PSB)).

Four formal VFM tests should be carried out at the following points:

1. at PPP Procurement Assessment – a test carried out to determine whether, and in what form, a PPP arrangement has the potential to offer the best value for money solution for the procurement;
2. at Completion of the Public Sector Benchmark (PSB) – to determine whether, in light of the quantifications in the PSB, the conclusion reached in the PPP Procurement Assessment still holds;
3. at Tender Evaluation stage - to compare the highest ranking bid against the PSB, to assess whether the highest ranking bid offers a potential value for money solution; and
4. at Financial Close – a final test carried out (a) to assess the impact of any changes in the interest rate and/or discount rate and (b) where the project has been procured using the

Negotiated Procedure, to examine the effect of any proposed changes in the contract terms.

- The Sponsoring Agency should draw up a detailed **Output Specifications** for the project, focusing on outputs rather than inputs.
- A **Public Sector Benchmark (PSB)** - a comprehensive estimate of the cost (including risk valuations) of procuring those elements of the project that the private sector is to be invited to tender for in the PPP contract - is derived from the Output Specifications. The final PSB cost should be expressed in Net Present Value (NPV) terms, thereby reflecting the time value of money. The Output Specifications and PSB should be finalised and should be up to date before any tender invitations are issued.
- In any procurement competition, all of the tenders received are first examined to determine whether they are "suitable" bids. Having identified the highest ranking bid received, the next step is to examine the value for money of that bid.
- As part of a **Post Project Review** a comparison of the actual outturn costs of the project (as provided for in the contract) with the initial estimated costs (as set out in the PSB) should be undertaken and recorded. A Post Project Review aims to draw lessons for the future and, therefore, any significant lessons learned from the review should be translated into changes in the Sponsoring Agency's project practices. Each Sponsoring Agency should maintain a cost database which should be used when benchmarking costs for future projects and in the compilation of future Public Sector Benchmarks. The post project review exercise should be used to inform and update this database with the latest available information. In addition, each sector should maintain a sector-specific risk database.
- In many instances, a PPP contract will include clauses that link payment to performance of specific obligations under the contract. In order to ensure that the full benefit is derived from these clauses, it is essential that the performance of the private sector partner is constantly monitored over the contract term and that these clauses are invoked, as appropriate.

Appendix B: Review of Components of Financial Comparator

The cost and revenue items comprising the net NRA costs under the PPP scenario were not determined by the NRA, rather they were determined by the PPP Concessionaire on the basis of the Concessionaire's own estimates of the costs and toll revenues they would likely incur in providing and maintaining the infrastructure. Therefore the analysis below is restricted to reviewing whether the costs and revenues comprising the Financial Comparator were reasonable approximations of the costs and revenues attributable to the NRA under a traditional procurement scenario.

There are three core elements comprising the net NRA costs associated with the traditional procurement (Financial Comparator) scenario. These are namely:

- overall construction, operational and lifecycle costs associated with constructing and operating the scheme (including the road and tolling facility);
- values assigned to the risks (both cost and revenue) assumed by the NRA; and
- the revenue from tolls.

The assumptions used in the VFM assessment with respect to each of these components are reviewed in Sections B1 – B3 below.

B1 Construction, O&M and Lifecycle Cost Estimates used in FC

The costs for each element as estimated in the original Financial Comparator (at ITN stage) are compared to the estimates provided by the five shortlisted ITN bidders in Table B1 below.

Table B1 Base Tender Costs and per Pre-Tender Estimate (2004 prices)

	Years	Capital Construction (€m)	O&M (€m)	Lifecycle (€m)	Total (€m)
Non Risk adjusted Pre-tender estimate	35	531	211	116	893
	45	531	254	144	974
Tender 1	■	■	■	■	866
Tender 2	■	■	■	■	784
Tender 3	■	■	■	■	765
Tender 4	■	■	■	■	926
Average of Tenders	35	452	237	65	774
	45		302	83	896

Source: M3 Clonee to Kells PPP Scheme, Tender Evaluation – Final Report (May 2005)¹⁸

On the basis of the data provided in Table B1, it is concluded that on aggregate, the overall cost estimates used in forming part of the Financial Comparator at ITN were:

- high in the case of capital cost being higher than all tenders and 17% above the tender average;
- low in the case of O&M cost being 11% below the 35 year tender average and 16% below the 45 year average;
- high in the case of lifecycle cost being 78% (35 year) and 73% above the tender average.

¹⁸ It should be noted that the pre-tender estimate figures presented in Table B1 represent the construction, O&M and lifecycle cost estimates at ITN stage (presented in nominal terms), and are thus not directly comparable to the Base Cost total presented in Table 4.1 which relate to the NPV of construction, O&M and lifecycle costs forming the FC at the final offer stage

Overall, the pre-tender estimate was 15% higher than the 35 year tender average and 9% higher than the 45 year tender average.

B2 Review of Risk Cost and Revenue Estimates in FC

Risk analysis formed an important element of the VFM assessment process. The following procedures were used in assessing the risk:

- Risk registers were prepared which identified, categorised and allocated risks;
- Risks were prioritised and quantified through a series of risk workshops and reviews;
- The risks were modelled in order to calculate the expected financial impact.

Risk workshops were held over the period June 2002 to September 2004. The workshops were attended by key stakeholders including the NRA, their advisers and the relevant authorities.

A risk register was developed in which the allocation of the risk costs under a PPP arrangement was identified (i.e. proportion attributed to public sector; private sector; or shared).

Risks not amenable to quantification, but with the potential to influence the VFM assessment, were identified separately as part of the VFM assessment.

The approach used was to assign a generic range of probabilities to each major risk category (Capital, Operational, Lifecycle etc), on the basis of risk estimates from previous schemes. The probabilities were applied to the total cost estimates of each category to quantify the level of risk for the category as a whole.

Cost Risk

As set out in Table B2, the major *cost* risks retained by the NRA under the traditional procurement FC scenario related to: construction risks, which totalled circa €95 million or 15% of the total base construction costs; operating cost risks which totalled €11 million or 14% of the total base operating costs; and whole life cost risks totalling €8 million or 12% of the scheme's whole life costs. The total cost risk value, which totalled €127 million or 13% of the total estimated scheme costs, is considered to represent a low estimation of cost risks, in light of the history of cost overruns in previous road schemes.

Demand Risk

As part of the Financial Comparator, the forecast value of total Toll Revenue was estimated having recourse of the traffic forecasts. The value of demand risk is estimated based on 35% of Toll Revenue. The total demand risk is €180 million.

Table B2 Overview of Cost Risks in Financial Comparator

Risk Category	Overview of Risk Type	Allocation of Risk	€m (% of Relevant Base Costs)	Total Risks
Capital	Risks relating to construction including roadway and toll	FC – all retained by NRA PPP – all transferred to PPP Co	95.2 (15% of base construction costs)	
Operating	Risks relating to operation and maintenance include the risks of estimation errors, service non availability, inflation, third party claims	FC – all retained by NRA PPP – all transferred to PPP Co	10.6 (14% of base operating costs)	
Lifecycle	Risks relating to a poorer than expected performance of key construction elements and/or materials	FC – all retained by NRA PPP – all transferred to PPP Co	7.7 (12 % of base lifecycle costs)	
Tolling	Risks relating to operating and lifecycle costs	FC – all retained by NRA PPP – all transferred to PPP Co	13.7 (9% of base tolling related costs)	
Total Cost Risk				127.1
Revenue	Risks relating to the uncertainty associated with the estimation of future demand levels	FC – all retained by NRA PPP – all bar €12.8 m transferred to PPP Co	179.7 (35% of total revenues)	
Total Revenue/Demand Risk				179.7

Source: *Financial Comparator Report - Amended, M3 Clonee to North of Kells Scheme, May 2005*

B3 Review of Toll Revenues in Financial Comparator

The key determinants of the estimated NRA toll revenues in the FC scenario were the forecast traffic volumes using the new motorway infrastructure.

Traffic Volumes

Since the opening of the M3 Clonee to Kells Scheme the traffic levels using the motorway have been significantly below the levels forecast (circa 40%). Therefore, the realised toll revenue is likely to be well below the forecast amount. The shortfall is likely to be in excess of the €180 million risk figure which represents 35% of total revenues.

Appendix C: Technical Note on Public Sector Benchmark

The following is an extract from the Technical Note on the compilation of a Public Sector Benchmark for a Public Private Partnership Project published by the Department of Public Expenditure and Reform which outlines current policy relating to disclosure of the Public Sector Benchmark.

“1.15 Disclosure of the Public Sector Benchmark

Current policy is that the PSB, or any elements thereof, is / are not made public during the tendering process on the basis that revealing the amount that the State is willing to pay may give tenderers an opportunity to increase their asking price above what they might otherwise seek. Where the public sector is likely to procure a similar project in the same or other sectors in the foreseeable future, the PSB (or any elements thereof) should not be released, even after the completion of the tendering process.

In the case of a once-off project, where it is not likely that there will be any similar procurement in the future, the release of the PSB after the contract has been signed could be considered, subject to the non-disclosure of risk valuations (see below). However, before releasing any of the PSB documentation, the Sponsoring Agency must be satisfied that none of the information being released could diminish the potential to secure value for money bids when procuring future projects.

If the Sponsoring Agency is satisfied that it is in order to disclose the PSB, it must advise the Sanctioning Authority of its intention to do so and of the basis for disclosure.

In no circumstances should the individual risk valuations set out in a PSB be disclosed and no information should be released in a format that would permit the identification of risk values. To do so would provide information on how the public sector values risk, which would prejudice the ability of the public sector to secure value for money in current and future projects through risk transfer. Similarly, it is important to ensure that information relating to the demand projections used in the development of a PSB for a Concession project (e.g., the Sponsoring Agency’s traffic forecasts for a toll road) is not disclosed.

Disclosure of any aspect of the PSB could have an adverse effect on the conduct by the Sponsoring Agency of PPP contract negotiations, particularly as information contained in the PSB could disclose positions taken in past or current negotiations and, indeed, positions that may be taken in future negotiations. Disclosure of the PSB, or elements thereof, may also give rise to an unwarranted loss to the Sponsoring Agency and/or an unwarranted gain to the private sector as access may be given to financial, commercial, industrial, scientific or technical information that belongs to the Sponsoring Agency.

The PSB, like other confidential and similar information relating to projects, is of course available to the Comptroller and Auditor General for inspection in connection with any reports his / her office may be progressing.”

N4 Kilcock – Kinnegad

Post Project Review



March 2014

Erratum Sheet

Post Project Review reports - Corrections

The Post Project Review reports were not originally intended for an external audience. There are in some cases errors in the reports with such errors ranging from typographical errors to in a small number of cases incorrect statements or errors in interpretation of the data (which have been identified as a consequence of subsequent reviews). We suggest that the following errata are taken into account when reviewing these reports.

4 PPP Procurement Review

4.2. Outcome of VFM Assessment (page 13)

Reference to Royalty Payments in PPP Option column is incorrect. This should refer to PPP Contract Mark-Ups and reflects the cost NRA assigned to PPP Co contract amendments.

4.4. Summary (page 14)

Following a detailed review of the components of the VFM assessment, it was determined that the net cost of the Financial Comparator was potentially overestimated by the order of €121-141m. This is mainly due to more recent traffic forecasts, used for this review, being more conservative than those used for the preparation of the Financial Comparator. A significant component of the shortfall in outturn traffic volumes was transferred to the PPP Co. Taking account of this review, the FC costs would still remain approximately €89-109m higher than the PPP option. The decision to procure the scheme as a PPP represented value for money for the Exchequer and was the appropriate decision for the scheme.

Should read

Following a detailed review of the components of the VFM assessment, it was determined that the net cost of the Financial Comparator was potentially underestimated by the order of €121-141m. This is mainly due to more recent traffic forecasts, used for this review, being more conservative than those used for the preparation of the Financial Comparator. A significant component of the shortfall in outturn traffic volumes was transferred to the PPP Co. Taking account of this review, the FC costs would be higher than those used in the VFM assessment increasing the cost differential compared with the PPP option. The decision to procure the scheme as a PPP represented value for money for the Exchequer and was the appropriate decision for the scheme.

5 PPP Scheme Implementation Review

5.4. Outturn Cost of PPP Scheme (page 18)

- the revenue share/royalty payments payable from the PPP scheme are different to those estimated in the tender evaluation process.

Should read

- **the revenue share payments payable from the PPP scheme are different to those estimated in the tender evaluation process.**

Important Notice

This report has been prepared by AECOM Limited. It is based on information and explanations provided by the National Roads Authority and has been prepared for the sole use of the National Roads Authority.

This Post Project Review report contains certain information of a commercially sensitive nature and should be kept confidential. This report contains information relating to tenderer's pricing and contains information on the Public Sector Benchmark. The PPP Guidelines (Technical Note on the compilation of a Public Sector Benchmark for a Public Private Partnership Project¹) published by the Department of Public Expenditure and Reform require public bodies to keep information relating to the Public Sector Benchmark confidential. This PPR report contains information relevant to the State's approach to evaluation of value for money in PPP competitions that the State may adopt in its future PPP competitions. Release of certain information contained in the Post Project review Report, whether on foot of freedom of information request or otherwise, would likely impact negatively on the State's commercial interests and would accordingly, not be in the public interest. In the event that you receive any request to disclose any information contained in the Post Project review report (whether pursuant to freedom of information legislation or otherwise), we would ask you to notify the National Roads Authority of this request prior to any disclosure being made so that our comments may be taken into account in any decision that might be taken in this regard.

¹ Appendix C contains an extract from the Technical Note on the compilation of a Public Sector Benchmark for a Public Private Partnership Project which outlines current policy relating to disclosure of the Public Sector Benchmark.

N4 Kilcock Kinnegad

Post Project Review

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Appendix A: Overview of PPP Guidance

Appendix B: Review of Components of Financial Comparator

Appendix C: Technical Note on Public Sector Benchmark

1. Introduction

1.1. The Scheme

The N4 Kilcock to Kinnegad Scheme comprises 39 kilometres of Wide Median Motorway which, when constructed in 2005, linked the N4 and the N6 National Primary Routes west of Kinnegad to the M4 motorway at Kilcock. The scheme also included three interchanges which provide access to and from the motorway to the local road network at Kinnegad, Enfield and Kilcock.



Figure 1.1 Map of Kilcock to Kinnegad Scheme

The scheme was procured as a Public Private Partnership (PPP) project, one of the first PPP road schemes to be procured in Ireland. The contract was awarded in March 2003 to the EuroLink Consortium.

In December 2005, the Kinnegad - Kilcock motorway was opened. Built as part of a Concession PPP Scheme, users of the motorway are tolled in accordance with the Toll Byelaws developed for the scheme.

This report comprises a Post Project Review of the N4 scheme.

1.2. Guidelines for Post-Project Review

Post Project Reviews are typically carried out a few years after the opening of a scheme. This allows the reviewer to make an initial assessment of the performance of the scheme.

The current standards for Post Project Reviews (PPR) of capital infrastructure projects are those set out in the 'Public Spending Code' issued by the Department of Public Expenditure and Reform (DPER). This Code specifies that the aim of such a PPR is to determine whether:

- The basis on which a project was undertaken proved correct;
- The expected benefits and outcomes materialised;
- The planned outcomes were the appropriate responses to actual public needs;
- The appraisal and management procedures adopted were satisfactory; and,

- Whether conclusions can be drawn which are applicable to other projects, to the ongoing use of assets, or to associated polices.

Since the early 2000s successive guidance documents have been published by various Government departments which set out the recommended steps that should be undertaken when implementing PPP projects in Ireland to ensure better Value for Money for the Exchequer.

The award of contract predates interim guidelines published by the Department of Finance² and a policy framework by the Department of environment Heritage and Local Government³ which were published later in 2003. An overview of PPP guidance is provided in Appendix A.

The PPP guidance that was in place at the time the N4 Kilcock Kinnegad Scheme was being planned was not as comprehensive as the current guidelines and, most notably, was not specific to road schemes.

The available guidance allowed the identification of some of the key areas that should be covered when completing Post Project Reviews of PPP Schemes, including

- Reviewing the PPP planning steps;
- Reviewing the PPP procurement decision; and
- Reviewing the PPP scheme implementation.

Similarly the NRA's project appraisal guidance has evolved through the years with the NRA's Project Appraisal Guidelines (first published in 2008⁴) determining the current recommended process to be followed.

On the basis of the overview of the guidance above, a two part approach to this Post Project Review was adopted. In the first instance, a value for money review of the scheme itself was undertaken, identifying the established project need, whether the project design process was properly planned, and whether the project is delivering benefits in excess of costs.

The second part of this Post Project Review (PPR) comprises a value for money review of the decision to procure the scheme as a PPP. This includes a review of the PPP pre-planning steps undertaken, a review of the PPP procurement decision, and a review of the PPP scheme implementation to date in terms of expected outcomes.

1.3. Layout of the Report

The broad structure of PPR is as follows: Section 2 outlines a traditional Post Project Review of the N4 Kilcock Kinnegad as a scheme. This is in line with the NRA *Project Appraisal Guidelines (PAG)*, the DPER *Public Spending Code* and the Department of Transport's '*Guidelines on a Common Appraisal Framework for Transport Projects and Programmes*', 2009.

Sections 3-5 focus on a review of the procurement of the scheme as a Public Private Partnership (PPP). Section 3 reviews the pre planning steps carried out by the NRA prior to procuring the scheme as a PPP. Section 4 reviews the basis of the decision to procure the scheme as a PPP, while Section 5 is concerned with the PPP project outturn relative to the outturn anticipated.

Finally Section 6 presents a summary of the PPR findings and recommendations.

² Interim Guidelines for the Provision of Infrastructure and Capital Investments through Public Private Partnerships – Department of Finance, July 2003

³ Policy Framework for Public Private Partnership (PPP) in Ireland – Department of the Environment Heritage and Local Government, November 2003. Note: Appendix 1 of the framework document provides a detail of the key documents in the PPP area prior to 2003

⁴ The Project Appraisal Guidelines were first published in 2008 and have developed incrementally from that point

2. Scheme Review

2.1. Introduction

As identified in Section 1, the '*Public Spending Code*' identifies a number of questions that need to be answered as part of a Post Project Review of a scheme. The approach taken here to address the requirements of the Code is to identify key stages in the scheme development and the key questions regarding each stage that address the requirements set out in the Code, as follows⁵:

- Scheme Conception
- Scheme Planning
- Scheme Implementation
- Scheme Operational Performance

2.2. Scheme Conception

2.2.1. Background

In the late 1990s the N4 National Primary Route between Dublin and Sligo was the principal route from Dublin to the west, linking with the N6 Galway route at Kinnegad and the N5 Castlebar route at Longford. The importance of developing the N4 route was first recognised in the 1989 National Development Plan. The development of the route was included in the Government's submission applying for community assistance in the *Operational Programme on Peripherality* in Ireland from the European Regional Development Fund.

In the early 1990s Kildare County Council commenced a Route Selection Study and held public meetings and displays however progress was abandoned in 1994 due to a shortfall in funding. In 1998, the NRA allocated monies to Westmeath County Council to recommence development of the route.

In 2000, the NRA announced the scheme would be progressed as a PPP scheme on the basis that a PPP could deliver

- (i) value for money when compared to traditional procurement;
- (ii) facilitate the injection of private finance and accelerate the delivery of the national road improvement schemes to reduce Ireland's infrastructural deficit; and
- (iii) ensure a high quality route that would offer a greatly improved service for users of the then existing N4, that would be capable of accommodating significant traffic volumes.

The contract was awarded in March 2003 to the EuroLink Consortium. In December 2005, the Kinnegad - Kilcock motorway was opened. The scheme comprises of 39 kilometres of Wide Median Motorway linking the N4 and the N6 National Primary Routes west of Kinnegad to the M4 motorway at Kilcock.

2.2.2. Need and Objectives

Prior to commencement of the N4 Kilcock to Kinnegad Scheme, most of the N4 route between Kilcock and Kinnegad consisted of two lane single carriageways, a proportion of which had no hard shoulder. Right turning lanes which had been incorporated into the route at a number of junctions for safety purposes were impeding overtaking and leading to delays at peak times.

Traffic surveys undertaken in November/December 1998 showed that the AADT flows on the N4 at Boycetown and Ardnamullen were exceeding the recommended AADT values for similar roads by 50.3% and 18.1% respectively. Research undertaken by a Consultant on behalf of Westmeath County

⁵ A more detailed summary of the relevant stages and key questions are set out in Appendix 1.

Council found that parts of the route were operating at Level of Service⁶ (LOS) E⁷ during busy hours and that between 75 and 90 per cent of vehicles using the road were delayed. It was forecast that the main sections of the route would experience LOS F (which points to frequent stop-start conditions, queues and delays) within a ten year period junctions, villages and urban sections reaching this level sooner.

The objectives for the N4 Kilcock Kinnegad Scheme were:

- relieve congestion at traffic congested towns along the N4;
- facilitate shorter travel times with associated cost savings;
- improve accessibility to the whole region; and
- to contribute to a reduction of fatal accidents along the route.

2.3. Scheme Planning

2.3.1. Current NRA Project Management and Appraisal Guidance

The present day guidelines were not in place at the time the N4 Kilcock Kinnegad was being developed. Indeed, the experience of this and other similar schemes is likely to have been an input to the development of the current guidelines. Nonetheless it is useful to examine the present day guidance.

As part of the NRA's current Project Management Guidelines (2010) and Project Appraisal Guidelines (2008 onwards) there are a number of recommended steps involved in the planning of a new road development. These are summarised in Table 2.1.

Table 2.1: Summary of Key Deliverables as per Current Guidance

Phase	Project Management Guidelines Deliverables	Project Appraisal Guidelines Deliverables
2 – Route Selection	Public Consultations Route Selection Report Variation to County Development Plan Public display (preferred route)	Traffic Modelling Report Cost Benefit Analysis Updated Project Brief Preliminary Business Case Project Appraisal Balance Sheet
3 - Design	Design Report	Revised Traffic Modelling Report CBA (using Target Cost and Total Scheme Budget)
4 – Statutory Processes	EIS/CPO documents	Revised Traffic Modelling Report CBA (using Target Cost and Total Scheme Budget) Updated Project Brief Revised Project Appraisal Balance Sheet Business Case
5 – Tender & award	Tender Documents Tender Report	Updated Traffic Modelling Report Updated Cost Benefit Analysis Updated Project Brief Updated Project Appraisal Balance Sheet Final Business Case

Source: NRA Project Management Guidelines 2010

⁶ The level of service (LOS) provided by roads is assessed using recognised international standards. LOS is a quality measure describing operational conditions within a traffic stream.

⁷ The National Development Plan 2000-2006 provided for the development of major inter-urban routes to motorway / high quality dual carriageway in their entirety with the aim of achieving level of service C.

2.3.2. *Guidance in Place at Scheme Preliminary Design Stage*

Both the 2010 Project Management Guidelines and the 2008 Project Appraisal Guidance were put in place by the NRA post the implementation of the scheme. Some elements of the scheme also predated the NRA's 2000 Project Management Guidelines and the DOT 2004 published '*Parameter Values for Use in Cost-Benefit Analysis of Transport Projects*'.

The main source of appraisal guidance in place at the time of the implementation of the scheme was the UK Design Manual for Roads and Bridges (DMRB) and the UK Treasury Taskforce policy statements and technical notes⁸. In addition, the National Roads Needs Study (1998), included forecast traffic growth on the national road network in Ireland over the period to 2019.

2.3.3. *Traffic Analysis and Forecasting*

The traffic analysis carried out for the scheme was underpinned by Traffic Surveys undertaken in November/December 1998. These showed that the Annual Average Daily Traffic (AADT) flow on the N4 was 21,500 vehicles per day at Killeighter between Enfield and Kilcock, and about 18,500 vehicles per day at Ardnamullen near Kinnegad. Beyond Kinnegad existing traffic was approximately 10,150 vehicles per day on the N4 and 8,180 vehicles per day on the N6. The base year for the traffic analysis was 2000. The year of opening was assumed to be 2005 and the design year 2025. Annual traffic growth rates of 3.8 per cent over the total design period were used.

2.3.4. *Route Selection and Preliminary Design*

When the formal Environmental Impact Study and Route Selection process commenced in 1998, six potential routes were identified. An additional route option located north of Kinnegad was added after a series of public consultations. A combination of the six original options was also analysed. The route was divided into three sections. Each route option was analysed over each of the sections, in terms of their engineering, environmental and economical impacts

The overall preferred route was composed of three separate route options over the three sections. A detailed analysis of the engineering, environmental and economic impacts of the various routes options formed the basis of the route selection process.

A project appraisal was not carried out at route selection stage.

2.3.5. *Project Appraisal*

In 2001, when the scheme reached detailed design stage a cost benefit using the COBA program was carried out. The parameter values used in the cost-benefit were those contained in the NRA National Roads Needs Study⁹, which reflect Irish conditions. This is appropriate, as, in 2001, the Department of Transport had not yet promulgated standard parameter values.

The pre-tender cost of the scheme was €235m (2004 prices)¹⁰.

Traffic flows were input into COBA as 2005 AADTs and a growth rate of 3.8 per cent per annum was used as the overall traffic growth implicit in the scheme forecasts for 2025. Traffic flows for the Do Minimum were derived by manually reassigning the 2005 scheme forecasts to the existing N4 network, while traffic flows on side roads and turning proportions at junctions were sourced from other

⁸ UK Treasury Taskforce "Policy Statement No. 2 – Public Sector Comparators and Value for Money" and "Technical Note No. 5 – How to Prepare a Public Sector Comparator"

⁹ The National Road Needs Study, NRA, Volume 2

¹⁰ This cost estimate related mainly to the construction cost estimate associated with the Scheme. As such, it did not take full account of the operational and maintenance costs associated with the Scheme. It also did not take account of the tolling costs, or the full cost risks associated with these cost items

traffic data made available from previous traffic surveys. A variable trip matrix assumption was used where the traffic flows in the Do Minimum case were held at a level corresponding to the capacity of the existing route, whilst those in the scheme case were allowed to grow unconstrained. The key results of the project appraisal were as follows:

- Net present value: €164.9m at 1996 prices
- Benefit-cost ratio: 1.94
- IRR: 13.45 per cent

The above results relate to an evaluation period of 20 years. No sensitivity tests to traffic forecasts or construction costs were undertaken.

2.3.6. Compliance with Procurement, EIS and other Statutory Requirements

An Environmental Impact Statement (EIS) was prepared for the N4 Kilcock Kinnegad Scheme.

Procurement of the N4 Kilcock Kinnegad Scheme was via a Public Private Partnership PPP arrangement advertised in the OJEC in November 2000. The preferred tender was selected in November 2002 and the contract signed in March 2003.

The above processes satisfied the statutory procedures at the time.

2.3.7. Adequacy of Consultation Processes

Following the identification of possible routes for the scheme, a public consultation process was undertaken where the views of the public and relevant bodies were given adequate opportunity to voice their issues and concerns with the proposed scheme. Resulting from the consultation process, an additional route was added to the routes considered for the scheme.

2.4. Scheme Implementation

The N4 Kilcock Kinnegad Scheme was procured as a PPP. The scheme implementation in terms of the delivery of the scheme to the specification as set out in the PPP Contract, the management of the PPP Contract, the budget schedule, and the budget outturn are explored in detail in Section 5, where the performance of the scheme is reviewed in terms of anticipated outcomes.

2.5. Scheme Operational Performance

2.5.1. Traffic Outcomes on the New Road

The objectives of the scheme were to relieve congestion at traffic congestion towns along the N4 corridor, facilitate shorter travel times with associated cost savings, improve accessibility to the whole region, and contribute to a reduction of fatal accidents along the route. Achievement of such objectives depends on the success of the scheme in attracting traffic from the N4. In this context, the key question is whether the scheme has achieved the predicted level of traffic volumes.

The Preliminary Design Report contains traffic predictions over a 20 year period from 2005 to 2025 for the scheme. Interpolating between these two dates yields the equivalent traffic predictions for 2008, 2010 and 2012 as set out in Table 2.2. As set out in the Table, the number of users of the motorway has shown initially positive and latterly negative divergences from those predicted albeit relatively small (less than 10% in each case).

Table 2.2: Comparison of Predicted and Actual Traffic Volumes, 2012

Kinnegad to Kilcock	Predicted AADT	Actual AADT	Divergence %
2008	20,588	22,556	+9.6
2010	22,180	23,119	+4.2
2012	23,895	22,361	-6.4

Therefore despite the economic recession, traffic volumes using the Kilcock – Kinnegad motorway are seen to be close to the levels predicted.

2.5.2. Road Safety Outcomes

A Stage 3 Road Safety Audit was carried out in July 2005 by Jacob Babbie Audit Team in the presence of An Garda Síochána. There have been no issues relating to the operation of the Motorway that have arisen post completion that have not been resolved speedily by the Concessionaire.

One of the objectives associated with the N4 Kilcock Kinnegad Scheme was a reduction in the level of fatal accidents along the route. Research has indicated that, historically, motorways have proved to be seven times safer than two lane roads in general and three times safer than dual carriageways¹¹.

The N4 Kilcock Kinnegad Scheme has resulted in a reduction in accidents on the N4 route since its opening in December 2005.

A comparison of the level of fatal collisions in the years before the opening of the scheme with the years after the scheme opened shows there has been over a 50% reduction in the average number of fatal collisions per annum along the Kilcock – Kinnegad national road corridor since the Motorway opening at the end of 2005¹².

2.5.3. Overall Economic Return to the State

The N4 Kilcock Kinnegad Scheme will deliver overall value for money for the State based on the following:

- Traffic volumes on the scheme have varied from marginally above to marginally below the level that underpinned the analysis carried out prior to the scheme being constructed;
- Non-users of the scheme have benefited significantly from reduced congestion, particularly in the towns along the old N4;
- The high traffic volumes using the scheme and the low fatal collision rate suggests that the safety benefits associated with motorways are being achieved.

¹¹ See: D O'Connell et al. Inter-urban Accident Rates by Road Type and Geometric Elements. Association of European Transport, 2004.

¹² Data based on Road Safety Authority data 2003 to 2011. Data for 2012 and 2013 is not yet available.

2.6. Summary

The N4 national road corridor is an important strategic corridor linking the east of the country with the west coast. In the late 1990s the level of service being provided on the national N4 road between Kilcock and Kinnegad was below the standard identified of roads of its type. Several sections along the route were experiencing significant delays at peak times.

The objectives of the scheme were to: relieve congestion at traffic congested towns along the N4; facilitate shorter travel times with associated cost savings; improve accessibility to the whole region; and to contribute to a reduction of fatal accidents along the route.

An economic appraisal of the scheme which was carried out at detailed design stage, confirmed the economic viability of the scheme. While traffic volumes are marginally below the level that underpinned this rate of return, the shortfall in traffic volumes, on its own, would not be sufficient to reduce the anticipated economic return below the minimum acceptable level. Similarly, the reduced level of fatal collisions suggests that the safety benefits associated with motorways are being achieved in respect of the N4 Kilcock Kinnegad Scheme.

A full cost-benefit analysis, incorporating outturn costs to the Exchequer and revised benefit estimates would be required to fully analyse the projected economic return. A revised CBA at the tendering stage now forms part of the NRA's Project Appraisal Guidelines, which addresses this shortcoming for all current/future schemes.

3. PPP Pre-Planning Review

3.1. Introduction

This section reviews the pre-planning steps completed by the NRA in progressing the N4 Kilcock Kinnegad Scheme as a PPP.

3.2. Background

A PPP is a partnership between the public and the private sector for the purpose of delivering a project. There is a sharing of project risks between the public and private sectors. A PPP project benefits from an accelerated implementation through the availability of private sector funding. This is particularly the case in situations of limited public finances, where access to private sources of funding allows the progression of projects that would not otherwise be possible.

A number of guidance documents have been published by the authorities with responsibility for implementing PPPs, since the first PPPs were procured in Ireland over ten years ago. A summary of some of the key PPP guidance documents is provided in Appendix A. There are a number of planning steps recommended when considering a scheme as a potential PPP.

3.3. PPP Scheme Selection

The *National Development Plan (NDP), 2000 - 2006* included an objective for the concentration of investment on the five strategic national roads linking the main urban areas in the country, one of which was the N4/N6 from Dublin to Galway. The NDP confirmed the policy for PPPs on being the maximum usage of PPP consistent with the principles of efficiency and best value for money. Minimum targets for PPP private funding were included in the NDP, including 23% of the total €5.97 billion 2000 – 2006 road investment programme.

In mid-1999 the Government requested that the NRA examine a number of schemes, including a planned 39km length of motorway on the N4/N6 route, to assess their potential as PPP schemes. The N4 Kilcock Kinnegad Scheme was announced as part of the NRA's Tranche II PPP roads programme in June 2000.

The NRA established certain key principles to guide its PPP road scheme selection analysis. These principles were as follows:

- The use of the PPP mechanism would not delay scheme delivery;
- An alternative toll-free route should be available for road users;
- Tolloed roads should be spread across the main national routes to create an equitable distribution of user-charging on the country's newly constructed road network;
- A road project needed to be a minimum of £30 million (€38m.) in value in order to produce value for money when using the PPP process; and
- A public subsidy would be considered for high cost schemes which could not be solely financed from tolls.

When examined in terms of these principles, the NRA determined that the N4 Kilcock Kinnegad Scheme met the criteria as a potential PPP scheme.

3.4. Shadow Bid Model

Prior to the commencement of the PPP tender process a Shadow Bid Model was developed by the financial advisors (KPMG) to the NRA. The SBM included the following input information:

- Projected traffic and toll level information provided by the NRA's traffic advisors;
- Scheme costs provided by NRA and/or its technical advisers (Babtie Group); and
- Financing assumptions in relation to debt, equity and economic assumptions.

The SBM was used to run a variety of financial scenarios which illustrated (or 'shadowed') how a private sector bidder might approach the scheme. The shadow bid model is used to inform decisions in relation to the structuring of the transaction to be provided for in the tender requirements. An overview of certain financial related tendering requirements as provided for in the N4 Kilcock-Kinnegad tender invitation documents are set out in the table below.

Key Features of the N4 Kilcock Kinnegad Scheme Tender Requirements

- The cumulative construction payments to the Tenderer could not exceed €160m (nominal)
- The construction payments to the Tenderer could not exceed €100m in any one contract year
- The operational payment could not exceed the Authority affordability limits of €5m per annum
- The winning Tender would be entitled to collect tolls from users over a 30 year period.
- Tenderers were required to share excess revenue with the NRA though varying proportion of revenue at different traffic levels with tenderers instructed to structure the Revenue Share such that the Tenderer would not make excessive profits

3.5. Value for Money (VFM) Assessment

The PPP planning guidance states that the decision to procure a project as a PPP should be based on a VFM assessment. This assessment compared the costs of procuring the scheme by traditional means (the Financial Comparator) with the equivalent costs of procuring the scheme by means of a PPP.

VFM comparisons were undertaken at various stages in order to ensure the continuing rationale for procuring the scheme through a PPP option. These stages are as follows:

- Prior to receipt of Invitation to Negotiate (ITN) Tenders;
- Following receipt of ITN Tenders; and
- Following the receipt of Best and Final Offers (BAFO).

A financial comparator was prepared as part of the Value for Money Assessment of the N4 Kilcock Kinnegad Scheme, which identified the costs of procuring the scheme using a traditional procurement approach.

3.6. Preparation of the Financial Comparator

The Financial Comparator (FC) consists of an assessment of the total costs that would be incurred in the provision of a scheme through a traditional procurement scenario in which the public sector retains managerial responsibility and exposure to risk. In preparing the FC for the N4 Kilcock Kinnegad Scheme, DOEHLG and UK Treasury guidance was used, as was the experience in preparing previous Financial Comparators by the NRA's specialist advisors i.e. technical (Babtie Group) and financial (KPMG).

As per the Guidance, the costs included in the FC were as follows:

- Base costs: the public sector's estimate of the costs it would incur to construct, maintain and manage the infrastructure to the duration and specification of the contract, before allowing for contingencies or risks.
- Retained risks: these risks, by their nature, always rest with the public sector;
- Risk retained under traditional procurement, but transferred under PPP: an allowance for the additional costs to the public sector as a consequence of the risks associated with the project.
- Efficiency adjustments: allows for the public sector improving its performance in managing base costs and the impact of risks over the life of the project.

As per the guidance, the FC was prepared prior to the receipt of ITN Tenders, to ensure it represented the NRA's best estimate of the cost of delivering the services required under the PPP scheme without being influenced by knowledge of the private sector's actual proposals¹³.

3.7. Risk Assessment

In preparing the FC the risks capable of being quantified, that differed between the public and private sectors were assessed.

In deciding the risk adjustment to apply to the base costs comprising the FC, risk workshops were held over the period September 2000 to October 2002. The workshops were attended by key stakeholders including the NRA, their advisers, the relevant Local Authorities and the Department of Finance.

A risk register was developed in which the allocation of the risk costs under a PPP arrangement was identified (i.e. proportion attributed to public sector; private sector; or shared).

Risks not amenable to quantification, but with the potential to influence the VFM assessment, were identified separately as part of the VFM assessment.

3.8. Identification of Non Monetary Costs and Benefits

Costs and benefits associated with each procurement option which were not amenable to quantification were also included in the VFM assessment. In order to identify the non-monetary costs and benefits associated with the PPP option, a separate workshop was held with the relevant stakeholders.

3.9. PPP Procurement Steps

Public Private Partnerships are a form of procurement and as such are subject to all the normal discipline applying to procurement generally, including Department of Finance procurement guidelines as well as EU Procurement Directives.

The procurement of the PPP scheme was conducted in an open and transparent manner, and in line with the relevant EU and national regulations.

¹³ Two Financial Comparator scenarios were modelled, one with public sector tolling and one without tolling

3.10. Summary

The planning steps implemented by the NRA prior to procuring the N4 Kilcock Kinnegad Scheme as a PPP were reviewed in line with the official PPP implementation guidance. The relevant steps advocated in the guidance documents were implemented by the NRA.

As set out in Section 2, the steps above would have been enhanced by the completion of a revised economic appraisal at the tendering stage. This would ensure explicit consideration would be given to updated cost/traffic projections relating to the scheme. As noted in Section 2, a revised CBA at the tendering stage now forms part of the NRA's Project Appraisal Guidelines, which addresses this shortcoming for all current/future schemes.

4. PPP Procurement Review

4.1. Introduction

This section includes a review of the VFM assessment undertaken to determine if the basis on which the decision was taken to procure the scheme as a PPP was appropriate.

4.2. Outcome of VFM Assessment

The VFM Assessment compared, over the lifetime of the concession project (30 years), the Net Present Value (NPV) of the Exchequer cash flows associated with the traditional procurement scenario, with the NPV of the Exchequer cash flows associated with the PPP procurement scenario.

Table 4.1 sets out, in summary format, the NPV of the NRA and Exchequer costs and revenues associated with both procurement options *at BAFO* (as per the successful concessionaire).

Table 4.1: Summary of Exchequer Costs (including VAT*) of the scheme at BAFO (2003 Prices)

Financial Comparator (Traditional Procurement – with tolling)	NPV 000 €	PPP Option Preferred Tenderer	NPV 000 €
Base Costs*	366,797	Construction payments	145,404
Toll Costs	91,539	Operational payments	5,946
Toll Revenue	-416,231	Revenue Share	-84,393
		Royalty Fee	472
Project risks retained (costs)	111,440	Risks retained in PPP and FC	1,636***
Less Revenue from lane occupation charges	-375	Less Revenue from lane occupation charges	-1,006
		Less Revenue from Non Availability Charges	
Total risk adjusted cost to NRA (before Revenue Risk)	153,170		
Project risks (Revenue)	148,448		
Total Risk adjusted cost to NRA**	301,612	Total Risk adjusted cost to NRA**	68,059
Less incremental cash flows to the Exchequer	-73,832	Less incremental cash flows to the Exchequer	-57,753
Risk adjusted cost to Public Sector	227,780	Risk adjusted cost to Public Sector	10,306

Source: Value for Money Assessment N4/N6 Kinnegad-Kilcock motorway 2002

* Base costs refer to construction €289m (€315m nominal), operation & maintenance €47m (€108m nominal) and lifecycle costs €30m (€81m nominal)

** Both cost totals were subsequently adjusted to take account of the tax implications (i.e. VAT etc.) associated with each procurement option

*** This risk value is associated with insufficient labour

As set out in the Table, there were estimated net costs associated with the PPP option, totalling €68m, compared to an estimated cost of traditional procurement totalling €302m¹⁴.

The higher estimated public sector costs associated with the (tolled) Financial Comparator option relative to the PPP option resulted in the decision being taken to procure the scheme as a PPP.

Weighted average traffic forecasts were used as part of the VFM assessment process to determine aggregate traffic levels using the Kilcock to Kinnegad Motorway. The actual levels have not reached the levels forecast. More specifically, LGV and HGV traffic volumes have fallen short of the weighted average levels forecast. With the exception of 2007, aggregate traffic volumes annually have been below those weighted traffic levels forecast. Since 2007, the traffic levels using the motorway have become more aligned with the low traffic forecasts which were used as part of the Value for Money assessment.

The N4 Kilcock Kinnegad Scheme was one of the first inter-urban PPP motorways to be procured in Ireland, as such experience in terms of likely diversion rates away from the tolled motorway would have been limited in an Irish context. Also, the economic recession is likely to have had a dampening effect on the levels of traffic using the motorway since 2007. With the benefit of hindsight, on the basis of the traffic levels that have materialised, it is estimated that toll revenue from the scheme under the traditional procurement scenario, where the State would have retained responsibility for tolling the Motorway, would total circa €275 - €295 million (NPV, non Risk adjusted value) over the life of the concession. This value is below the level of toll revenue estimated in the Financial Comparator as part of the VFM Assessment (€416m).

4.3. Review of Components of Financial Comparator

A detailed review was undertaken to determine if the individual cost and revenue items included in the Financial Comparator and PPP options represent accurate approximations of the costs and revenues attributable to the Exchequer under each procurement option. Full details of this review are included in Appendix B which can be summarised as follows:

- The whole life costs in the Financial Comparator were circa €7m higher than those estimated by the average ITN Tenderers;
- The risk values associated with the FC scenario revealed that the cost risk values of €111m (25% of total costs) are broadly acceptable; and
- Toll revenue from the scheme under the traditional procurement scenario would likely total €275-€295m over the life of the concession compared to the €416m estimated in the VFM assessment.

4.4. Summary

The NRA's decision to procure the N4 Kilcock Kinnegad Scheme as a PPP was based on a VFM Assessment. The results of the VFM assessment showed there were higher NRA costs to the order of €230m associated with the Financial Comparator relative to the PPP option, which resulted in the decision being taken to procure the scheme as a PPP.

Following a detailed review of the components of the VFM assessment, it was determined that the net cost of the Financial Comparator was potentially overestimated by the order of €121-141m. This is mainly due to more recent traffic forecasts, used for this review, being more conservative than those used for the preparation of the Financial Comparator. A significant component of the shortfall in

¹⁴ As previously indicated, owing to the uncertainty surrounding whether the motorway would be tolled in the event that the public sector undertook its construction and operation, a non-tolled Financial Comparator option was also modelled as part of the VFM Assessment. The non-tolled FC option represented a greater net cost to the NRA as no toll revenues were attributable to the Exchequer under this option. Owing to the fact that the differential between the Exchequer costs associated with the FC and PPP options was lower for the tolled FC scenario, the remainder of this Section is restricted to reviewing the tolled Financial Comparator scenario.

outturn traffic volumes was transferred to the PPP Co. Taking account of this review, the FC costs would still remain approximately €89-109m higher than the PPP option. The decision to procure the scheme as a PPP represented value for money for the Exchequer and was the appropriate decision for the scheme.

5. PPP Scheme Implementation Review

5.1. Introduction

This section reviews the implementation of the N4 Kilcock Kinnegad Scheme to date. The scheme's implementation is reviewed across three key criteria, as follows:

- **Timing:** A review of the time taken to complete the various stages of the scheme
- **Quality:** An analysis of whether the key elements of the scheme as per the project specification were achieved; and
- **Costs and Revenues/Traffic Volumes:** an analysis of the public sector costs associated with PPP scheme relative to initial estimates.

5.2. Timing of PPP Scheme Implementation

As part of its 2000 Best Practice Guidelines, the Department of the Taoiseach (DOT) stated that a PPP approach should be adopted wherever it would “*accelerate the implementation of a particular project*”. In the Framework for Public Private Partnerships - Working Together for Quality Public Service, published by the Social Partners in 2000, the principles underpinning the PPP programme were set out, including: “*PPPs should maximise the benefits of private sector efficiency, expertise, flexibility and innovation*”.

Tables 5.1 and 5.2 set out the procurement and construction periods associated with the N4 Kilcock Kinnegad Scheme.

Table 5.1: Procurement Timelines

Date	Task
Pre Qualification	
November 2000	Notice dispatched to OJEC
December 2000	OJEC Notice
April 2001	Short listing of Pre-Qual tenders
ITN Tender Phase	
September 2001	Tender Invitation Documents issued
February 2002	Submission of Tenders for short listing
BAFO Tender Phase	
August 2002	BAFO Invitation
September 2002	Receipt of BAFO Submissions
March 2003	Contract Award
Road Opening	
December 2005	Road Opening

Source: NRA

Table 5.2: N4 Kilcock Kinnegad Scheme Timelines

	No of Months
Start Procurement - end Procurement	28
Start Construction - end Construction	33
Start Procurement - end Construction	61

The procurement period, from date of first issue of the OJEC notice to contract award to the successful PPP bidder, totalled 28 months. The PPP contract was awarded to the successful bidder in March 2003. The motorway scheme's was opened 33 months later in December 2005.

It was not possible to identify equivalent procurement and construction timeframes for roads of a similar scale to the N4 Kilcock Kinnegad Scheme¹⁵. As such, the review of the scheme's timeliness is restricted to a review of the targets set for the scheme. The motorway scheme was scheduled to be complete in October 2006. The actual motorway opening took place in December 2005, ten months ahead of schedule.

5.3. Quality of PPP Scheme Implementation

In reviewing the PPP scheme's implementation, a number of key areas were reviewed:

- the delivery of the scheme to the specification of the PPP contract;
- the management procedures put in place by the NRA; and
- the contract management in the design, construction and operational phases.

5.3.1. Delivery of Key Element of the Scheme

The N4 Kilcock Kinnegad Scheme was delivered in line with the contract specification. There have been no issues relating to the quality of the scheme post completion that have not been addressed speedily by the concessionaire, in line with the terms of the contract.

5.3.2. PPP Management by the NRA

The progression of the scheme was managed by a newly established PPP unit within the NRA. In line with published guidance, the NRA contracted legal, financial and technical advisers to assist with:

- the devising of an appropriate procurement mechanism;
- the drawing up of detailed contract documents; and
- assessing and selecting PPP consortia for the scheme.

To date, the management of the PPP scheme contract has run smoothly. The PPP Concessionaire, in line with its obligations, has provided the NRA with its reporting requirements, including: Winter maintenance reports; Annual reports; Annual performance reports; five yearly management plans; and Monthly O&M reports.

5.3.3. Contract Management during Design and Construction

The NRA contracted technical engineers to project manage the design and construction of the scheme on its behalf. Over the course of the construction period, the NRA was provided with a monthly construction period report.

5.3.4. Contract Management during Operation

The NRA's management of the operational phase of the PPP contract has operated on the same basis as the design and construction phase, namely technical support has been contracted in as required. NRA staff members are allocated supervisory roles for individual PPP schemes. As part of this supervisory role, the NRA staff member is responsible for reviewing the reports provided by the PPP Concessionaire, making on-sites visits to the scheme and administering the contract.

5.4. Outturn Cost of PPP Scheme

One of the key principles underpinning the implementation of PPP infrastructure projects in Ireland is the obtaining of better Value for Money for the NRA and the Exchequer. The Department of Finance

¹⁵ Such a comparison would be possible if the schemes in the PPP programme were compared to a sample of similar non PPP road schemes.

PPP Implementation guidance (see Appendix A) stated that Ex-Post Reviews of PPP Schemes should contain a comparison of the actual PPP outturn costs (as provided for in the PPP contract¹⁶) with the initial estimated costs of the scheme (as set out in the Financial Comparator).

The actual PPP outturn cost to the Exchequer is identified in the PPP contract and as such, the PPP outturn cost remains unchanged except where:

- any variation costs are potentially introduced after financial close; and/or
- the revenue share/royalty payments payable from the PPP scheme are different to those estimated in the tender evaluation process.

The estimated NRA costs associated with the preferred PPP option totalled a net cost of €68m, which was significantly below the estimated cost of traditional procurement, which are estimated to total €302m (see Table 4.1).

Since the signing of the PPP Contract with the concessionaire, actual Revenue Share payments arising from the PPP scheme have differed to those estimated as part of the tender evaluation process due to lower than forecast levels of usage of the motorway by goods vehicles. As a result, the actual outturn cost to the NRA associated with the PPP scenario is likely to differ to that estimated at Financial Close. This is explored in more detail in the below. While Revenue Share was part of the NRA's tender evaluation criteria, a primary purpose underpinning the sharing arrangements is to limit the potential for excessive returns such that concessionaire would not make excessive profits in their high traffic scenario. Actual revenue share payments are determined on traffic levels using the Motorway.

5.4.1. Traffic Levels

Table 5.3 and Figure 5.1 below set out a comparison of the NRA traffic forecasts used as part of the VFM Assessment process and the actual traffic volumes which have materialised since the opening of the scheme in December 2005.

Table 5.3: Forecast NRA Weighted Average and Actual Traffic Volumes

Year	NRA Low	NRA Medium	NRA High	NRA Weighted Average	Actual Traffic	Difference (%) WA and Actual	Annual Growth Rate (WA)	Annual Growth Rate (Actual)
2006	17,681	21,234	25,667	20,611	19,243	-6.6		
2007	18,493	22,289	27,154	21,637	22,030	1.8	+5.0	+14.5
2008	19,343	23,398	28,727	22,714	22,555	-0.7	+5.0	+2.4
2009	20,231	24,561	30,392	23,845	22,465	-5.8	+5.0	-0.4
2010	21,160	25,782	32,153	25,033	23,119	-7.6	+5.0	+2.9
2011	21,671	26,505	33,282	25,732	22,880	-11.1	+2.8	-1.0
2012	22,194	27,248	34,450	26,452	22,361	-15.5	+2.8	-2.3

Source: NRA

¹⁶ The actual costs incurred by the PPP Concessionaire in providing the infrastructure and services as per the specification incorporated into PPP contract is unknown, because the Concessionaire is not required to provide this information to the NRA. The outturn cost data that is available relates to the estimated outturn NRA costs associated with the PPP Contract, as signed by the Concessionaire at Financial Close. This cost estimate incorporates any agreed contributions to construction and operational costs payable by the NRA to the Concessionaire less any revenue share/royalty payments payable to the NRA.

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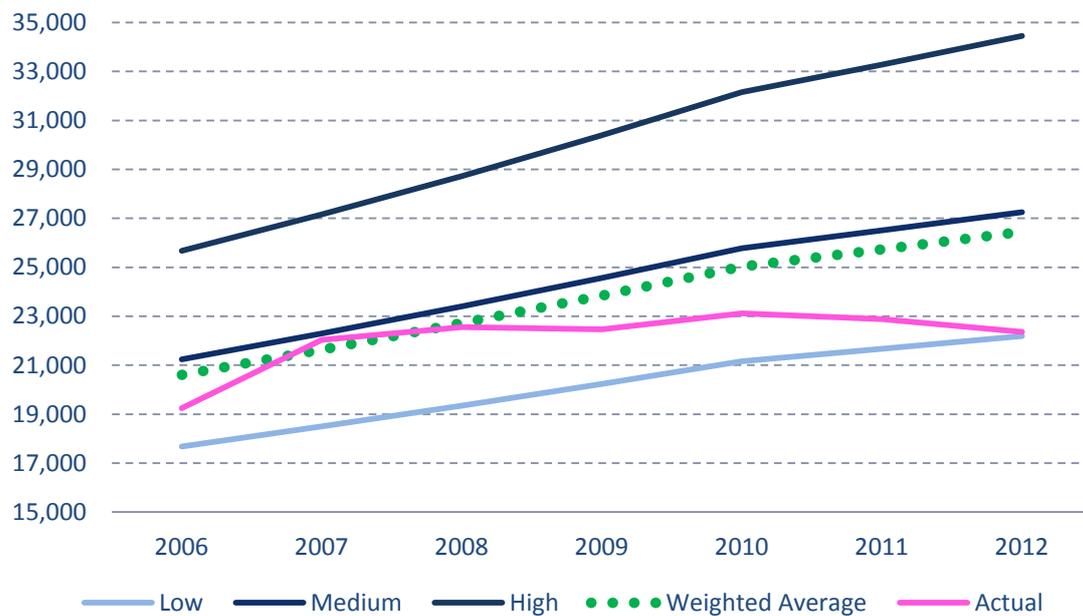


Figure 5.1: Forecast NRA and Actual Traffic Volumes (Source: NRA)

As Table 5.3 and Figure 5.1 highlight, actual traffic volumes were marginally below predictions until 2008 after which, the actual numbers remained relatively steady. The growth that was predicted did not materialise.

Examining the traffic volumes by vehicle type reveals that the principal reason for the difference between actual traffic volume and those predicted are Heavy Goods Vehicles (HGVs) and to a lesser extent Light Goods Vehicles (LGVs). This is shown in Table 5.4 where the actual proportions of traffic are compared to those used in the forecasts.

Table 5.4: Forecast and Actual Traffic Proportions

Year	Car	LGV	HGV 2&3 axel	HGV 4+ axel	Motorcycles	Bus/Coach
Forecast*	72.9 %	12.0 %	6.6 %	7.4 %	0.1 %	1.0 %
2006 Actual	87.0 %	8.8 %	1.3 %	1.9 %	0.4 %	0.6 %
2007 Actual	85.0 %	9.6 %	1.7 %	2.8 %	0.3 %	0.6 %
2008 Actual	83.2 %	10.4 %	2.0 %	3.6 %	0.2 %	0.6 %
2009 Actual	83.4 %	10.2 %	2.3 %	3.1 %	0.2 %	0.7 %
2010 Actual	83.2 %	9.9 %	2.6 %	3.2 %	0.2 %	0.9 %
2011 Actual	83.5 %	9.3 %	2.3 %	3.6 %	0.2 %	1.1 %
2012 Actual	83.2 %	9.3 %	2.1 %	4.0 %	0.2 %	1.2 %

*2006-2012 forecast in low medium and high scenarios

The shortfall in HGV traffic volumes is at least partly explained by the economic recession, which has seen a significant reduction in construction activity in the economy, which a corresponding reduction in the need to transport construction materials.

However, an analysis of the Heavy Commercial Vehicle¹⁷ (HCV) traffic using the motorway and the pre-motorway N4 route indicates a significant level of diversion taking place away from tolled motorway.

Over the 2005 – 2006 period, there was a 62% fall off in the number of daily vehicles using the N4 at Clonard, as traffic moved on to the new scheme; the equivalent proportions for HCVs and non-HCVs were 30% and 66% respectively. While some of the HCV traffic shortfalls that have materialised on the new motorway can likely be attributed to the recession which has gained momentum since 2007, it is also evident that there was a significant level of diversion taking place away from tolled motorway on the part of HCVs in 2006.

The reduced level of HGV usage of the Motorway has had implications in terms of revenue share payable to the NRA.

5.4.2. Revenue Share Payments

The lower level of traffic volumes have resulted in some a reduced level of revenue share payments to the NRA as set out in Table 5.5. The shortfall from 2006-2012 was over €8m (undiscounted).

Table 5.5: Forecast and Actual Revenue Share Payments

Year	Forecast Revenue Share (€)	Actual Revenue Share (€)
2006	429,000	82,033
2007	1,070,189	453,881
2008	1,330,104	561,191
2009	1,658,282	583,763
2010	2,175,196	838,113
2011	2,527,892	742,079
2012	2,914,466	630,346

Source: NRA

5.4.3. Implications for Total Outturn Cost associated with PPP Option

As set out above, initial traffic levels using the N4 Kilcock Kinnegad Scheme have not achieved the levels forecast as part of the Value for Money assessment process, resulting in reduced revenue share payments. Given the differentials that have materialised in relation to the forecast and actual proportional shares of both HGV and LGVs, it appears likely that the level of (HCV) diversion away from the Motorway has exceeded anticipated levels.

A number of scenarios have been modelled in terms of estimating the total revenue share payable to NRA over the concession period, on the basis of the traffic that has materialised to date. The scenarios modelled include:

- **Scenario 1:** 2014-2032 traffic growth as per of the VFM Assessment process
- **Scenario 2:** 2014-2032 traffic growth as per the high traffic growth scenario in the NRA PAG
- **Scenario 3:** 2014-2018 traffic growth accelerates to meet the traffic forecasts used in the VFM assessment over the period 2018-2032

The level of revenue share toll payments over the life of the concession period (as set out in Table 5.6) is circa €17-26m. This is significantly below the estimated €84m which was estimated as part of the VFM assessment.

¹⁷ Heavy Commercial Vehicles (HCVs) includes Heavy Goods Vehicles (HGVs) and Buses & Coaches

Table 5.6: NPV of Forecast NRA Revenue Share Payments 2006 – 2032, 2002 Prices

	Scenario 1 (€m)	Scenario 2 (€m)	Scenario 3 (€m)	PPP Bidder Using NRA Traffic Forecasts (€m)
Revenue Share €000	22.2	16.5	26.0	84.4

Source: AECOM estimates

The reduced level of Revenue Share toll payments over the life of the concession period will by definition increase the total Exchequer costs associated with the scheme relative to the cost estimates as part of the VFM assessment process.

However, given the effect the lower than forecast traffic volumes would also have had on the procurements costs associated with the traditional procurement (FC) scenario, it is considered that the assessment of better value for money associated with the PPP procurement remains valid.

5.5. Summary

The N4 Kilcock Kinnegad Scheme's implementation was reviewed in terms of the timing of the scheme, the quality achieved by the scheme and the actual materialised costs of the scheme against initial estimates.

The construction of the scheme commenced in March 2003 and completed in December 2005, ten months ahead of Schedule.

The scheme was delivered in line with the specification set out in the concession contract. There have been no issues relating to the quality of the scheme post completion that have not been addressed speedily by the concessionaire, in line with the terms of the contract.

Since the signing of the N4 Kilcock Kinnegad Scheme Contract with the concessionaire, the total revenue share payable to the NRA annually from the scheme has fallen short of forecasts, as the actual traffic volumes using the scheme have fallen short of the medium and high forecast levels, most notably in the case of LGVs and HGVs.

The short-fall in Revenue Share payments will increase the actual outturn cost to the Exchequer associated with the PPP scenario. With the benefit of hindsight, it is estimated that the actual NRA costs of the PPP scheme will total somewhere between circa €125m and €136m, an increase of circa €58-68m over the cost envisaged in the VFM assessment.

Notwithstanding this, in light of the effect the lower actual traffic volumes would have had on the costs associated with the traditional procurement (FC) scenario, it is considered that the better value for money associated with the PPP procurement option remains valid.

6. Summary and Conclusions

The N4 Kilcock Kinnegad Scheme was adequately planned both in terms of the statutory procedures, appraisal, routes selection and consultation and the planning undertaken in relation to the decision to procure the scheme as a Public Private Partnership (PPP).

One exception was that the economic appraisal of the scheme was not re-visited at procurement stage, when revised costs estimates associated with the scheme were available. This approach was in line with the available guidance at the time and a revised cost-benefit analysis at the tendering stage now forms part of the NRA Project Appraisal Guidelines. This addresses this shortcoming for all current/future scenarios.

The scheme has delivered on its objectives including relieving congestions in towns along the old N4 route, facilitating shorter travel times and contributing to a reduction in fatal accidents.

The level of benefits has not materialised as expected due to the lower than forecast levels of traffic using the scheme. This is in part due to the weakened economic situation but also a high level of Heavy Goods Vehicles and Light Goods Vehicles are diverting away from the tolled scheme.

During the implementation of the scheme, the appropriate management procedures adopted were satisfactory and in line with best practice guidance at the time. The implementation of the scheme as a PPP resulted in the scheme being delivered ahead of schedule and in line with the quality specified in the PPP contract.

Although, the level of traffic that materialised was not of the level forecast, the decision to procure the scheme as a PPP does represent value for money for the Exchequer.

Appendix A: Overview of PPP Guidance

Developing the Infrastructure Requirements of the National Development Plan: Best Practice Guidelines for Project Implementation, Department of the Taoiseach, 2000

As part of its 2000 Best Practice Guidelines, the Department of the Taoiseach (DOT) stated that a public private partnership approach should be adopted wherever it would accelerate the implementation of a particular project and represent better value for money over the full life cycle of the project. The DOT also stated that the most appropriate form of PPP (ranging from design and build to design, build, finance and operate) should be adopted having regard to the particular circumstances of the individual project.

Framework for Public Private Partnerships, Working together for Quality Public service. 2000

In 2000, a framework document endorsed by IBEC, ICTU, CIF, the Department of Finance and the Departments and Agencies engaged in the PPP process was published by the Social Partners. In the Framework a clear statements of the principles underpinning the PPP programme were set out, namely:

- PPPs should yield value for money for the Exchequer;
- PPPs should allocate risks to the party best able to control and manage them; and
- PPPs should maximise the benefits of private sector efficiency, expertise, flexibility and innovation.

A Policy Framework for Public Private Partnerships (PWC), DOEHLG 2000

In 2000, the then Department of Environment, Heritage and Local Government commissioned PWC to produce a framework within which PPP projects could be advanced in the roads, water and waste sectors. The resultant Policy Framework detailed policy guidance covering each stage in the development, implementation and management of PPP projects. Some of the key guidance points identified in the resulting policy framework document include:

- **Market soundings** should be undertaken to determine the level of interest among the private sector and the capability of the private sector market to undertake prospective PPP projects.
- An **Output Specification** should be prepared which defines the services required by the public sector which the private sector would be responsible for providing as part of a PPP project. The actual design of the works necessary to deliver that service would be left to the successful private sector tenderer.
- A key driver of the PPP programme is the desire to increase **Value for Money (VFM)** in infrastructure procurement. To ensure that value for money is achieved, the Contracting Authority should be able to demonstrate that the option selected offers better value for money than the alternatives. The VFM assessment should not be seen as a single step but one that is carried through the life of the project. An initial PPP Assessment should be completed at the Option Appraisal stage to determine the potential for a PPP to deliver improved value for money compared with a traditional procurement. The final VFM assessment can only be made at the conclusion of the procurement process.
- In the case of projects where the public sector is the sole or main purchaser, the VFM undertaken at the end of the procurement process should comprise two key elements:
 - Monetary comparison – a comparison of the cost of the preferred Public Private Partnership tender, with the cost of traditional public sector procurement (the Financial Comparator), expressed in terms of discounted cash flows over the life of the PPP contract; and

- Non-monetary comparison – a comparison of all the factors that are difficult to quantify in monetary terms, but their value to government and the wider public is significant. Examples include speed of project delivery, quality of service, and security of supply.
- One of the principles underlying PPPs is that risk should be allocated to the party best able to manage it. A detailed **risk assessment** should be undertaken for every PPP project.
- Central and Contracting Authorities will need to retain legal and financial advisers, as well as technical specialists, especially for Design, Build, Operate and Finance contracts and Concession contracts.

Policy Framework for Public Private Partnership (PPP) in Ireland: Project Implementation in the Local Government Sector, DOEHLG, Nov 2003

In 2003, the then Department of Environment, Heritage and Local Government published a policy framework document to guide the local government sector in the implementation of PPPs. The guidance highlighted the steps which all public projects must follow to ensure that the projects are properly examined and assessed, that the necessary statutory and administrative approvals are obtained, and that the procurement process is carried out in an efficient manner. It also highlighted the PPP specific tasks in relation to those steps, as follows:

- Project Identification – on the basis of an established business case/need for a project, the project receives the approval of a Sanctioning Authority. If a PPP approach is being considered some **market soundings** may be carried out to establish if there is market interest in the project.
- Option appraisal – during this phase various options for carrying out the project are examined, if the preferred option is a PPP, a PPP assessment report is completed which: determines the form the PPP will take; and establishes the **optimum allocation of risk** between public and private sector. Stakeholder consultation is carried out as part of a PPP Assessment Report. If the PPP procurement route is chosen, Department approval is sought before a Project Auditor is chosen, external advisors appointed, and a project steering group established.
- Statutory processes – the LA is responsible for preparing the project to go to procurement, including ensuring that the various planning and land acquisition and access consents are obtained.
- Pre-procurement - a **Public Service Benchmark (PSB)** cost is prepared, Departmental approval is sought for the project to go to procurement and an affordability cap is set based on the PSB.
- Procurement – the project is taken through the procurement process, when completed a tender recommendation report is submitted, and Departmental approval is sought to go to construction.
- Construction and operation – the contractor commences construction, variations may need to be referred to Department. When the LA is satisfied with the infrastructure provided, it signs off on the project and the operational contract commences.
- **Review of the PPP Process** – the performance of the project is reviewed
- Expiry of Contract

The Review of the PPP Process refers to the review of the performance of the project. As part of the policy framework document, the DOEHLG identified the objectives associated with the post project review of PPPs as follows:

- provide data on costs as an input to assessments (Public Sector Benchmarks) of subsequent PPP projects;
- provide public authorities with information on the economic benefits, or otherwise, of the PPP approach over alternative procurement approaches;
- identify the strengths and weaknesses in the systems in place for managing PPP projects.

It was noted that the Review of PPPs should contain the following:

- a brief description of the project;
- an outline of the project history with key decisions /events highlighted;
- a variance analysis of the final outturn costs of the project compared against initial estimates, the PSB, Affordability Cap and the Final Contract price;
- an analysis of the time taken to complete different stages of the project compared with projections; and
- the extraction of selected costs for the Department's database of costs on PPP projects.

Guidelines for the Provision of Infrastructure and Capital Investments through Public Private Partnerships: Procedures for the Assessment, Approval, Audit, and Procurement of Projects, 2006, Department of Finance

The Department of Finance (DOF) 2006 Guidelines for the Provision of Infrastructure and Capital Investments through Public Private Partnerships replaced Interim Guidelines published by the DOF in July 2003. The 2006 DOF Guidelines identified four distinct strands or functions associated with PPP projects as follows: the project appraisal function, the approval function, the procurement function and the audit function. Best practice would require an appropriate separation of functions between these strands.

1. The Sponsoring Agency is responsible for appraising projects. As part of the Detailed Appraisal, the Sponsoring Agency should determine the most appropriate procurement mechanism and, if a PPP approach is being considered, a PPP Procurement Assessment should be carried out.
2. Following appraisal of the proposed project, the Sponsoring Agency should approach the Sanctioning Authority for approval to proceed with the procurement of the project as a PPP.
3. PPP projects must be procured in line with all regulatory and EU procurement requirements in regard to tendering and bid evaluation.
4. There is a particular audit requirement in regard to PPP which is additional to the requirements outlined in the *Capital Appraisal Guidelines*, i.e. the appointment of a Process Auditor. A Process Auditor must be appointed for all PPP projects or grouped PPP projects where the capital cost is in excess of, or is likely to exceed, the limit specified by the Department of Finance (then €20 million).

Some of the key guidance points identified in the DOF 2006 Guidelines include:

- **Affordability:** A Sanctioning Authority should not allow a project to proceed unless it is satisfied that the overall capital cost of the project as a whole, including both PPP and non-PPP elements, can be accommodated within the Capital Envelope allocation(s) available to the Sponsoring Agency.
- **Value for Money:** VFM needs to be considered at two levels:
 - The overall VFM of the project – i.e. does the project as a whole offer good value for money; and
 - The VFM of the PPP contract – i.e. do the aspects of the project that are being procured by PPP represent good value for money, particularly when compared with the cost of achieving the same objective by traditional procurement (as represented by the Public Sector Benchmark (PSB)).

Four formal VFM tests should be carried out at the following points:

1. at PPP Procurement Assessment – a test carried out to determine whether, and in what form, a PPP arrangement has the potential to offer the best value for money solution for the procurement;
 2. at Completion of the Public Sector Benchmark (PSB) – to determine whether, in light of the quantifications in the PSB, the conclusion reached in the PPP Procurement Assessment still holds;
 3. at Tender Evaluation stage - to compare the highest ranking bid against the PSB, to assess whether the highest ranking bid offers a potential value for money solution; and
 4. at Financial Close – a final test carried out (a) to assess the impact of any changes in the interest rate and/or discount rate and (b) where the project has been procured using the Negotiated Procedure, to examine the effect of any proposed changes in the contract terms.
- The Sponsoring Agency should draw up a detailed **Output Specifications** for the project, focusing on outputs rather than inputs.
 - A **Public Sector Benchmark (PSB)** - a comprehensive estimate of the cost (including risk valuations) of procuring those elements of the project that the private sector is to be invited to tender for in the PPP contract - is derived from the Output Specifications. The final PSB cost should be expressed in Net Present Value (NPV) terms, thereby reflecting the time value of money. The Output Specifications and PSB should be finalised and should be up to date before any tender invitations are issued.
 - In any procurement competition, all of the tenders received are first examined to determine whether they are “suitable” bids. Having identified the highest ranking bid received, the next step is to examine the value for money of that bid.
 - As part of a **Post Project Review** a comparison of the actual outturn costs of the project (as provided for in the contract) with the initial estimated costs (as set out in the PSB) should be undertaken and recorded. A Post Project Review aims to draw lessons for the future and, therefore, any significant lessons learned from the review should be translated into changes in the Sponsoring Agency’s project practices. Each Sponsoring Agency should maintain a cost database which should be used when benchmarking costs for future projects and in the compilation of future Public Sector Benchmarks. The post project review exercise should be used to inform and update this database with the latest available information. In addition, each sector should maintain a sector-specific risk database.
 - In many instances, a PPP contract will include clauses that link payment to performance of specific obligations under the contract. In order to ensure that the full benefit is derived from these clauses, it is essential that the performance of the private sector partner is constantly monitored over the contract term and that these clauses are invoked, as appropriate.

Appendix B: Review of Components of Financial Comparator

As previously identified, the cost and revenue items comprising the net NRA costs under the PPP scenario were not determined by the NRA, rather they were determined by the PPP Concessionaire on the basis of the Concessionaire's own estimates of the costs and toll revenues they would likely incur in providing and maintaining the infrastructure. The analysis below is thus restricted to reviewing whether the costs and revenues comprising the Financial Comparator were reasonable approximations of the costs and revenues attributable to the NRA under a traditional procurement scenario.

There are three core elements comprising the net NRA costs associated with the traditional procurement (Financial Comparator) scenario. These are namely:

- overall construction, operational and lifecycle costs associated with constructing and operating the scheme (including the road and tolling facility);
- values assigned to the risks (both cost and revenue) assumed by the NRA; and
- the revenue from tolls.

The assumptions used in the VFM assessment with respect to each of these components are reviewed in Sections B1 – B3 below.

B1 Construction, O&M and Lifecycle Cost Estimates used in FC

The costs for each element as estimated in the original Financial Comparator (at ITN stage) are compared to the estimates provided by the average of the ITN bidders in Table B1 below.

Table B1: Construction, O&M & Lifecycle Costs as per Pre-Tender Estimate & ITN bidders (2002 prices)¹⁸

Cost (€000)	Total Construction	ITN Total O&M 2006	ITN Total O&M 2015	ITN Total O&M 2030)	ITN Lifecycle Cost (undiscounted)
Pre-tender estimate	256,659	4,192	4,998	5,384	56,532
Tender Average	257,527	4,000	4,914	5,052	49,736

Source: N4/N6 Kinnegad-Kilcock Motorway Tender Evaluation Final Report April 2002

On the basis of the data provided in Table B1, it is concluded that on aggregate, the construction costs estimates forming part of the Financial Comparator at ITN were good approximations of the estimated costs associated with these expenditure items.

B2 Review of Risk Cost and Revenue Estimates in FC

Risk analysis is an important element of the VFM assessment process. In determining the risk adjustments that needed to be applied to the base costs and revenues forming the Financial Comparator, risk workshops were held where key stakeholders gave consideration to “*how relevant risks had occurred in the past in the public sector and how they could be managed in the future, attempting to avoid optimistic bias in estimates*” (Financial Comparator N4/N6 Kinnegad-Kilcock Motorway BAFO Update November 2002, pg 15).¹⁹

¹⁸ It should be noted that the pre-tender estimate figures presented in Table B1 represent the construction, O&M and lifecycle cost estimates at ITN stage (presented in nominal terms), and are thus not directly comparable to the Base Cost total presented in Table 4.1 which relate to the NPV of construction, O&M and lifecycle costs forming the FC at the BAFO stage

¹⁹ As part of the risk analysis, the following process was adopted: Risk registers were prepared which identified, categorised and allocated the main project risks to either the NRA or the PPP Company depending on who would bear the risk under the FC or PPP

Each of the quantifiable risks identified, were categorised according to whether they belonged to the following categories: project specific risks; planning risks; design risks; construction risks; operating risks; demand risks; financial risks; or legislative risks. Table B2 sets out the risks items identified in the risk register, their allocation under the procurement type scenarios, as well as the value put on the risk during the risk workshops.

Cost Risk

As set out in Table B2, the major *cost* risks retained by the NRA under the traditional procurement FC scenario related to: construction risks, which totalled circa €71 million or 25% of the total base construction costs; design risks which totalled €12.7 million or 4% of the total base design costs; and project specific risks totalling €11.1 million or 4% of the scheme's project specific costs. The total cost risk value, which totalled €111m or 25% of the total estimated scheme costs, is considered to represent a standard estimation of cost risks, given the history of cost overruns in previous road schemes.

Demand Risk

As part of the Financial Comparator, the forecast value of total Toll Revenue was estimated having recourse of the weighted average traffic forecasts, which were based on 25%/60%/15% probabilities being assigned to low/medium/high traffic growth scenarios respectively. Owing to the probabilities used, the weighted average forecasts were not in effect very different to the medium/central traffic forecasts, (circa 3% below the medium forecasts). Because the weighted average traffic forecasts did not differ substantially from the medium traffic, a relatively small value (not significantly different to the €12m (NPV) set out in Table B3 (NPV)) was attributed to this risk item²⁰. It would have been expected that the value of risk associated with 'user-charging' (i.e. failure to secure anticipated toll revenue) would have been greater than €12m (representing just 3% of total toll revenue) allocated to this risk item. In practice very little downside risk was assumed. Consideration of possible variability in demand suggests that the level of risk associated with 'user-charging' would be higher, given the nature of the proposed scheme.

Conversely, the value of demand risk associated with external developments (i.e. the reduced tolls due to limited inflationary price increases) at €108m (representing 26% of total forecast toll revenue of €416m) appears high.

procurement scenarios; The risks were prioritised and quantified through a series of risk workshops and reviews; The risks were modelled in order to calculate the expected financial impact of the risks over the concession period.

²⁰ Owing to the use of weighted average traffic forecasts in estimating toll revenue under the traditional procurement scenario, it is not clear why an additional user risk value associated with User Charging was incorporated into the FC to account for demand side risk.

Table B2: Overview of Cost Risks in Financial Comparator (NPV 2002 Prices)

Risk Category	Overview of Risk Type	Allocation of Risk	€000 (% of Relevant Base Costs)	Total Risks
Project specific	Risks predominately related to construction, including the potential for estimating errors, unforeseen archaeological sites and utility diversions	FC – all retained by NRA PPP – all transferred to PPP Co with exception of one item related to Fisheries Board	11.1 (4% of base construction costs)	
Planning	Risks relating predominately to obtaining planning permission	<i>The planning risks were eliminated as all planning permissions were received</i>	-	
Design	Risks related to the scheme design including the potential for design drift and additional design costs as more detailed information becomes available	FC – 95% retained by NRA PPP – 85% transferred to PPP Co	12.7 (4% of base construction costs)	
Construction	Risks relating to construction including: variations (38m), ground works (20m), weather (2m), time (6.5m), labour resources (1.6m), construction inflation (1.1m)	FC – all retained by NRA PPP – all transferred to PPP Co	70.9 (25% of base construction costs)	
O&M	Risks relating to operation and maintenance include the risks of variations (2.7m), estimation errors (1.5m), service non availability (1.7m), third party claims (1.5m)	FC – all retained by NRA PPP – all transferred to PPP Co	7.2 (17% of base operating costs)	
Lifecycle	Risks relating to a poorer than expected performance of key construction elements and/or materials	FC – all retained by NRA PPP – all transferred to PPP Co	3.9 (13% of base lifecycle costs)	
Tolling	Risks relating to a lower than anticipated life expectancy of the tolling infrastructure due to deficiencies in design or build quality owing to estimation errors (4.8m) and variations (0.8m)	FC – all retained by NRA PPP – all transferred to PPP Co	5.7 (16% of base tolling related costs)	
Financial	Risks relating to variables including interest rates and other cost of finance fluctuations, as well as insurance costs		-	
Legislative	Risks relating to legislation		-	
Total Cost Risk				111.5
Demand	Risks relating to the uncertainty associated with the estimation of future traffic levels and ultimately toll revenues. Total demand risk is comprised of reduced revenue due to limited inflation (109m); leakage of tolls (21m); user charging (12m) and late revenue collection (7m).	FC – all retained by NRA PPP – shared with the PPP Co with exception of leakage of tolls which is fully transferred to PPP Co	148.4 (36% of total tolling revenues)	
Total Revenue/Demand Risk				148.4

Source: Financial Comparator N4/N6 Kinnegad-Kilcock Motorway BAFO Update November 2002

Table B3: Summary of Demand Risk Items

Risk Item	€m	%
External developments - reflects reduced toll revenues due to the risk of a delayed start of toll indexation and decreased level of toll indexation	108.5	73.1
Leakage of tolls – reflects reduced toll revenues on basis of 5% of toll revenues being lost due to users not paying, users paying incorrectly, potential double use of tickets	21	14.2
User Charging – reflects failure to secure anticipated toll revenue because of lower levels of traffic volumes due to adverse economic circumstances; probabilities were assigned to low, medium and high traffic scenarios	12	8.1
Late Revenue Collection – reflects loss of toll revenue due to potentially late completion of construction and late start of toll collection	7	4.7
Total	148.5	

Source: Financial Comparator N4/N6 Kinnegad-Kilcock Motorway BAFO Update November 2002

B3 Review of Toll Revenues in Financial Comparator

The key determinants of the estimated NRA toll revenues in the FC scenario were the forecast traffic volumes using the new motorway infrastructure.

Traffic Volumes

The revenue attributable to the NRA (in the case of the FC - where all toll revenue would be attributable to the NRA), was estimated in the VFM Assessment process using weighted average traffic forecasts, which was based on 25%/60%/15% probabilities being assigned to low/medium/high traffic growth scenarios respectively.

Since the opening of the N4 Kilcock Kinnegad Scheme, the traffic levels using the M4 tolled motorway have not reached the levels forecast as per the weighted average traffic forecasts which were used as part of the VFM assessment process. More specifically, LGV and HGV traffic volumes have fallen short of the weighted average levels forecast.

On the basis of the traffic levels that have materialised, it is estimated that toll revenue from the scheme under the traditional procurement scenario, where the State would have retained responsibility for tolling the Motorway, would total circa €275 - €295 million (NPV, non Risk adjusted value) over the life of the concession. This value is below the level of toll revenue estimated in the Financial Comparator as part of the VFM Assessment (€416m).

Appendix C: Technical Note on Public Sector Benchmark

The following is an extract from the Technical Note on the compilation of a Public Sector Benchmark for a Public Private Partnership Project published by the Department of Public Expenditure and Reform which outlines current policy relating to disclosure of the Public Sector Benchmark.

“1.15 Disclosure of the Public Sector Benchmark

Current policy is that the PSB, or any elements thereof, is / are not made public during the tendering process on the basis that revealing the amount that the State is willing to pay may give tenderers an opportunity to increase their asking price above what they might otherwise seek. Where the public sector is likely to procure a similar project in the same or other sectors in the foreseeable future, the PSB (or any elements thereof) should not be released, even after the completion of the tendering process.

In the case of a once-off project, where it is not likely that there will be any similar procurement in the future, the release of the PSB after the contract has been signed could be considered, subject to the non-disclosure of risk valuations (see below). However, before releasing any of the PSB documentation, the Sponsoring Agency must be satisfied that none of the information being released could diminish the potential to secure value for money bids when procuring future projects.

If the Sponsoring Agency is satisfied that it is in order to disclose the PSB, it must advise the Sanctioning Authority of its intention to do so and of the basis for disclosure.

In no circumstances should the individual risk valuations set out in a PSB be disclosed and no information should be released in a format that would permit the identification of risk values. To do so would provide information on how the public sector values risk, which would prejudice the ability of the public sector to secure value for money in current and future projects through risk transfer. Similarly, it is important to ensure that information relating to the demand projections used in the development of a PSB for a Concession project (e.g., the Sponsoring Agency’s traffic forecasts for a toll road) is not disclosed.

Disclosure of any aspect of the PSB could have an adverse effect on the conduct by the Sponsoring Agency of PPP contract negotiations, particularly as information contained in the PSB could disclose positions taken in past or current negotiations and, indeed, positions that may be taken in future negotiations. Disclosure of the PSB, or elements thereof, may also give rise to an unwarranted loss to the Sponsoring Agency and/or an unwarranted gain to the private sector as access may be given to financial, commercial, industrial, scientific or technical information that belongs to the Sponsoring Agency.

The PSB, like other confidential and similar information relating to projects, is of course available to the Comptroller and Auditor General for inspection in connection with any reports his / her office may be progressing.”

M6 Galway to Ballinasloe

Post Project Review



December 2014

Erratum Sheet

Post Project Review reports - Corrections

The Post Project Review reports were not originally intended for an external audience. There are in some cases errors in the reports with such errors ranging from typographical errors to in a small number of cases incorrect statements or errors in interpretation of the data (which have been identified as a consequence of subsequent reviews). We suggest that the following errata are taken into account when reviewing these reports.

2 Scheme Review

2.3.6 *Compliance with Procurement, EIS and other Statutory Requirements (page 9)*

Procurement of the M6 Galway to Ballinasloe Scheme was via a Public Private Partnership (PPP) arrangement advertised in the OJEU in May 2005. The preferred tender was selected in July 2006 and the contract signed in December 2006

Should read

Procurement of the M6 Galway to Ballinasloe Scheme was via a Public Private Partnership (PPP) arrangement advertised in the OJEU in May 2005. The preferred tender was selected in July 2006 and the contract signed in April 2007.

5 PPP Scheme Implementation Review

5.4 *Outturn Cost of PPP Scheme (page 22)*

Arising from various variations relating to the works requirements an additional payment of €16 million was made by the NRA to the PPP Concessionaire.

Should read

Arising from various variations relating to the works requirements and a claim from the PPP Co an additional payment of €16 million was made by the NRA to the PPP Concessionaire.

Important Notice

This report has been prepared by AECOM Limited. It is based on information and explanations provided by the National Roads Authority and has been prepared for the sole use of the National Roads Authority.

This Post Project Review report contains certain information of a commercially sensitive nature and should be kept confidential. This report contains information relating to tenderer's pricing and contains information on the Public Sector Benchmark. The PPP Guidelines (Technical Note on the compilation of a Public Sector Benchmark for a Public Private Partnership Project¹) published by the Department of Public Expenditure and Reform require public bodies to keep information relating to the Public Sector Benchmark confidential. This PPR report contains information relevant to the State's approach to evaluation of value for money in PPP competitions that the State may adopt in its future PPP competitions. Release of certain information contained in the Post Project Review report, whether on foot of freedom of information request or otherwise, would likely impact negatively on the State's commercial interests and would accordingly, not be in the public interest. In the event that the recipient receives any request to disclose any information contained in the Post Project Review report (whether pursuant to freedom of information legislation or otherwise), we would ask you to notify the National Roads Authority of this request prior to any disclosure being made so that our comments may be taken into account in any decision that might be taken in this regard.

¹ Appendix C contains an extract from the Technical Note on the compilation of a Public Sector Benchmark for a Public Private Partnership Project which outlines current policy relating to disclosure of the Public Sector Benchmark.

M6 Galway to Ballinasloe

Post Project Review

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Appendix A: Overview of PPP Guidance

Appendix B: Review of Components of Financial Comparator

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Executive Summary

The M6 Galway to Ballinasloe Scheme involves the provision of 52 km of standard two-lane motorway, approximately 4 km of dual carriageway and approximately 40 km of single carriageway and link roads. The scheme is tolled at a single point between Ballinasloe and Loughrea.

Procurement of the scheme commenced in May 2005 with the contract awarded in April 2007. The scheme opened in December 2009 four months ahead of schedule.

Since the opening of the M6 Galway to Ballinasloe Scheme, it has contributed to a significant reduction in the volumes of traffic in the towns and villages along the old N6 corridor and a reduction in overall traffic congestion.

The economic appraisal of the scheme was published in 2004 and demonstrated a positive economic case for the scheme. Since opening, the traffic volumes using the scheme are circa 20% below the levels used in the economic appraisal. Such a reduction in traffic volumes over the lifetime of the scheme would more than negate the predicted net economic benefits. However, given the economic climate in Ireland during the scheme's first four years in operation, this performance is unlikely to be representative of the performance of the scheme over its full 30-year lifetime.

The decision to procure the scheme as a PPP was also reviewed. The NRA's decision to procure the M6 Galway to Ballinasloe Scheme as a PPP was based on a VFM Assessment with the cost to the Public Sector found to be substantially lower for the PPP option.

The PPP contract was structured to ensure the majority of traffic risk rested with the private sector. As a result, the traffic shortfall is primarily a cost to the private sector. It is therefore considered that the decision to procure the scheme as a PPP represents value for money for the Exchequer and is justified.

In summary, the shortfall in traffic volumes has led to an erosion of the economic case for the scheme. However, the Exchequer is insulated from the impacts of lower traffic due to the majority of associated cost resting with the private sector.

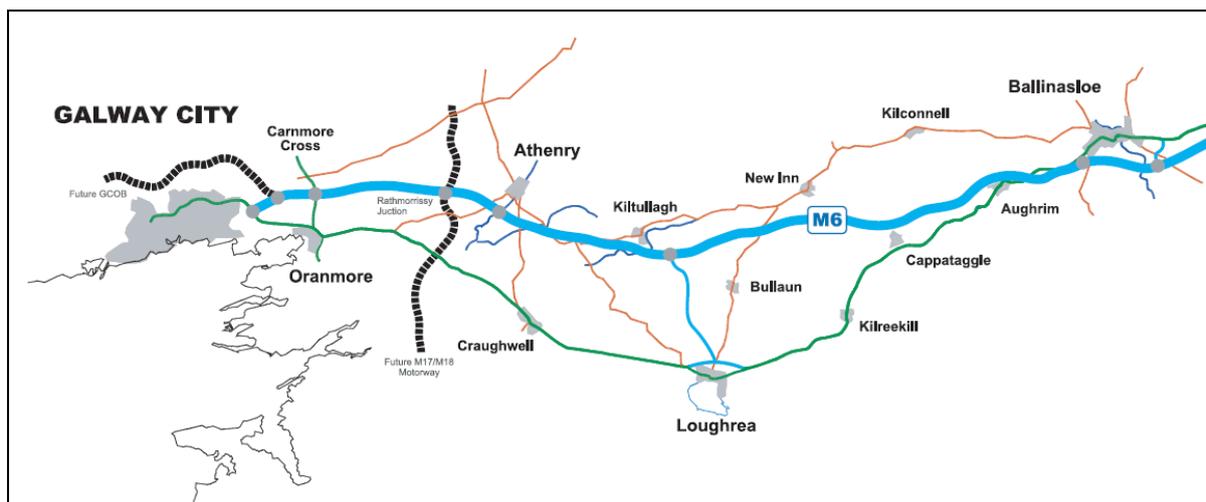
1 Introduction

1.1 The Scheme

The M6 Galway to Ballinasloe Scheme involves the provision of 52 km of standard two-lane motorway, approximately 4 km of dual carriageway, a 7 km link road to Loughrea, 32 km of single carriageway link roads and four grade separated junctions.

The scheme covers the route of the M6 from the eastern side of Galway city to the east of Ballinasloe.

Figure 1.1 Map of M6 Galway to Ballinasloe Scheme



Procured as a Public Private Partnership (PPP) project, the Contract was awarded to the ICON Consortium in April 2007, and will extend for 30 years from that date. In December 2009 the scheme was opened. Built as part of a Concession PPP Scheme, users of the motorway are tolled in accordance with the Toll Byelaws developed for the scheme.

This report comprises a Post Project Review of the M6 Galway to Ballinasloe Scheme.

1.2 Guidelines for Post-Project Review

Post Project Reviews are typically carried out a few years after the opening of a scheme. This allows the reviewer to make an initial assessment of the performance of the scheme.

The current standards for Post Project Reviews (PPR) of capital infrastructure projects are those set out in the 'Public Spending Code' first published by the Department of Public Expenditure and Reform (DPER) in 2011. This Code specifies that the aim of such a PPR is to determine whether:

- The basis on which a project was undertaken proved correct;
- The expected benefits and outcomes materialised;
- The planned outcomes were the appropriate responses to actual public needs;
- The appraisal and management procedures adopted were satisfactory; and,
- Whether conclusions can be drawn which are applicable to other projects, to the ongoing use of assets, or to associated policies.

Since the early 2000s successive guidance documents have been published by various Government departments which set out the recommended steps that should be undertaken when implementing PPP projects in Ireland to ensure better value for money for the exchequer.

The available guidance at the time includes a policy framework by the Department of Environment Heritage and Local Government² and updated guidelines published by the Department of Finance³. The Department of Finance guidelines were published in 2006 at which point planning for the M6 Galway to Ballinasloe Scheme was well advanced. An overview of PPP guidance is provided in Appendix A.

The PPP guidance that was in place at the time the M6 Galway to Ballinasloe Scheme was being planned was not as comprehensive as the most recent guidelines.

The available guidance allowed the identification of some of the key areas that should be covered when completing Post Project Reviews of PPP Schemes, including

- Reviewing the PPP planning steps;
- Reviewing the PPP procurement decision; and
- Reviewing the PPP scheme implementation.

Similarly the NRA's project appraisal guidance has evolved through the years with the NRA's Project Appraisal Guidelines (first published in 2008⁴) determining the current recommended process to be followed.

On the basis of the overview of the guidance above, a two part approach to this Post Project Review was adopted. In the first instance, a value for money review of the scheme itself was undertaken, identifying the established project need, whether the project design process was properly planned, and whether the project is delivering benefits in excess of costs.

The second part of this Post Project Review (PPR) comprises a value for money review of the decision to procure the scheme as a PPP. This includes a review of the PPP pre-planning steps undertaken, a review of the PPP procurement decision, and a review of the PPP scheme implementation to date in terms of expected outcomes.

1.3 Layout of the Report

The broad structure of PPR is as follows: Section 2 outlines a traditional Post Project Review of the M6 Galway to Ballinasloe as a scheme. This is in line with the NRA *Project Appraisal Guidelines* (PAG), the DPER *Public Spending Code* and the Department of Transport's '*Guidelines on a Common Appraisal Framework for Transport Projects and Programmes*', 2009.

Sections 3-5 focus on a review of the procurement of the scheme as a Public Private Partnership (PPP). Section 3 reviews the pre planning steps carried out by the NRA prior to procuring the scheme as a PPP. Section 4 reviews the basis of the decision to procure the scheme as a PPP, while Section 5 is concerned with the PPP project outturn relative to the outturn anticipated. Finally Section 6 presents a summary of the PPR findings and recommendations.

² Policy Framework for Public Private Partnership (PPP) in Ireland – Department of the Environment Heritage and Local Government, November 2003. Note: Appendix 1 of the framework document provides a detail of the key documents in the PPP area prior to 2003

³ Guidelines for the Provision of Infrastructure and Capital Investments through Public Private Partnerships: Procedures for the Assessment, Approval, Audit and Procurement of Projects – Department of Finance, July 2006

⁴ The Project Appraisal Guidelines were first published in 2008 and have developed incrementally from that point

2 Scheme Review

2.1 Introduction

As identified in Section 1, the *'Public Spending Code'* identifies a number of questions that need to be answered as part of a Post Project Review of a scheme. The approach taken here to address the requirements of the Code is to identify key stages in the scheme development and the key questions regarding each stage that address the requirements set out in the Code, as follows⁵:

- Scheme Conception
- Scheme Planning
- Scheme Implementation
- Scheme Operational Performance

2.2 Scheme Conception

2.2.1 Background

The M6 Galway to Ballinasloe Scheme was procured as a Public Private Partnership incorporating the design and construction of 52 km of new standard two-lane motorway, 4 km of dual carriageway and ancillary roads.

The M6 Galway to Ballinasloe Scheme is an important element of the national road network, forming part of the N4/N6 Dublin to Galway route.

The existing N6 between Galway and Ballinasloe generally consisted of single carriageway road with some portions not having hard shoulders. The route passed through a number of towns and villages including Craughwell, Kilreekill, Loughrea and Ballinasloe. There was considerable traffic congestion in these towns impacting the quality of life of residents.

The scheme was developed as a PPP scheme on the basis that a PPP could deliver

- (i) value for money when compared to traditional procurement;
- (ii) facilitate the injection of private finance and accelerate the delivery of the national road improvement schemes to reduce Ireland's infrastructural deficit; and
- (iii) ensure a high quality route that would offer a greatly improved service for users of the then existing N6, that would be capable of accommodating significant traffic volumes.

The Contract to construct the scheme was awarded in April 2007 and the scheme opened in December 2009.

2.2.2 Need and Objectives

The need for an improved N6 routes between Galway and Ballinasloe was identified in a number of national policy documents, namely:

- The National Road Needs Study 1998
- The National Development Plan 2000 - 2006
- Galway County Development Plan 2003 – 2009
- Galway County Borough Development Plan 1999
- Roscommon Country Development Plan 2002
- Ballinasloe Town Development Plan 2003-2009

The National Roads Need Study identified a number of improvements required along the N6 route. It recommended a dual carriageway between Galway and Loughrea, a bypass of Loughrea and a wide

⁵ A more detailed summary of the relevant stages and key questions are set out in Appendix A.

single carriageway between Loughrea and Ballinasloe. The M6 Galway to Ballinasloe Scheme is a more substantial scheme than that proposed but nonetheless fulfils the needs identified in the National Road Needs Study.

The National Development Plan 2000 – 2006 identified a high quality road link from Dublin to Galway as a route to be developed to motorway/high quality dual carriageway standard. The M6 Galway to Ballinasloe Scheme forms part of this link.

The Galway County Development Plan 2003-2009 has a number of aims and policies which include:

- To create a receptive development environment in anticipation of a transfer of investment funding and employment opportunity from the east coast as part of the National Spatial Strategy;
- To afford people a wide choice of locations in which to live by supporting the further improvement of these locations in terms of quality and availability of services, access to employment, transport to and from these locations and connections from these locations to national transport networks; and
- Facilitate the safe and efficient movement of people and goods in the interest of the economy.

The Galway County Development Plan states that the development under strategic route corridors in County Galway is being implemented under nine schemes. The M6 Galway to Ballinasloe Scheme is specifically listed with an objective to facilitate the development of the scheme included.

2.3 Scheme Planning

2.3.1 Current NRA Project Management and Appraisal Guidance

The present day guidelines were not in place at the time the M6 Galway to Ballinasloe Scheme was being developed. Indeed, the experience of this and other similar schemes is likely to have been an input to the development of the current guidelines. Nonetheless it is useful to examine the present day guidance.

As part of the NRA's current Project Management Guidelines (2010) and Project Appraisal Guidelines (2008 onwards) there are a number of recommended steps involved in the planning of a new road development. These are summarised in Table 2.1.

Table 2.1 Summary of Key Deliverables as per Current Guidance

Phase	Project Management Guidelines Deliverables	Project Appraisal Guidelines Deliverables
2 – Route Selection	Public Consultations Route Selection Report Variation to County Development Plan Public display (preferred route)	Traffic Modelling Report Cost Benefit Analysis Updated Project Brief Preliminary Business Case Project Appraisal Balance Sheet
3 - Design	Design Report	Revised Traffic Modelling Report CBA (using Target Cost and Total Scheme Budget)
4 – Statutory Processes	EIS/CPO documents	Revised Traffic Modelling Report CBA (using Target Cost and Total Scheme Budget) Updated Project Brief Revised Project Appraisal Balance Sheet Business Case
5 – Tender & award	Tender Documents Tender Report	Updated Traffic Modelling Report Updated Cost Benefit Analysis Updated Project Brief Updated Project Appraisal Balance Sheet Final Business Case

Source: NRA Project Management Guidelines 2010

2.3.2 Guidance in Place at Scheme Preliminary Design Stage

Both the 2010 Project Management Guidelines and the 2008 Project Appraisal Guidance were put in place by the NRA post the awarding of the contract for this scheme. Some elements of the scheme also pre-dated the NRA’s 2000 Project Management Guidelines and the DOT 2004 published ‘Parameter Values for Use in Cost-Benefit Analysis of Transport Projects’.

The main source of appraisal guidance in place at the time of the implementation of the scheme was the UK Design Manual for Roads and Bridges (DMRB) and the UK Treasury Taskforce policy statements and technical notes⁶. In addition, the National Roads Needs Study (1998), included forecast traffic growth on the national road network in Ireland over the period to 2019.

2.3.3 Traffic Analysis and Forecasting

MCOS were appointed in 2001 to complete a study of proposed improvements to the N6 between Galway and Ballinasloe and to investigate the possibility of placing a toll on the scheme for road users.

A computerised traffic simulation model (SATURN) was prepared by MCOS representing existing conditions on the road network, and modelling the effects of the M6 Galway to Ballinasloe Scheme proposal. The model area included the existing N6 and all other routes in the Athlone-Galway corridor that carry longer-distance traffic.

Given the lack of significant urban areas (other than Ballinasloe and Loughrea), an all-day, 12-hour model factored to 24 hours was judged to be appropriate.

The traffic model was based on traffic data sourced by road side interview (RSI) surveys of the origin and destination and purpose of trips and automatic traffic counters. The years modelled included the scheme opening year (2008) and the design year (2028)

There were a number of schemes proposed in the area including:

⁶ UK Treasury Taskforce “Policy Statement No. 2 – Public Sector Comparators and Value for Money” and “Technical Note No. 5 – How to Prepare a Public Sector Comparator”

- The N6 Ballinasloe to Athlone Scheme;
- The Galway City Outer Bypass;
- The N17 Tuam to Galway Scheme; and
- The N18 Gort to Oranmore Scheme.

As the M6 Galway to Ballinasloe Scheme was due to be the first project built, the traffic study examined two scenarios:

- The M6 Galway to Ballinasloe Scheme only; and
- All of the schemes combined

In addition, the option of introducing tolls at different locations on the M6 Galway to Ballinasloe Scheme was examined.

Forecast trip matrices were developed by factoring the base 2000 matrices with growth factors produced as part of the National Roads Needs Study.

The traffic study included an additional growth assumption of 15%. This was primarily based on higher than expected levels of population growth driven by economic growth.

The initial study was published in February 2004 with adjustments made in June 2004 reflecting changes to junction locations. The results were contained in an updated report published in August 2005.

The Ballinasloe to Athlone Scheme opened in July 2009 – five months before the M6 Galway to Ballinasloe Scheme. These are the only two schemes built to date.

The increase in traffic forecasts for the scenario encompassing all of the schemes combined was higher by approximately 4% in 2008 and 3% in 2028 over the scenario with the M6 Galway to Ballinasloe Scheme only. It cannot be determined from the traffic study what the projections would be for the current situation (i.e. Ballinasloe to Athlone and M6 Galway to Ballinasloe schemes only).

The traffic figures provided in Table 2.2 below show the traffic forecasts from the final study (August 2005) where only the M6 Galway to Ballinasloe Scheme is built.

Table 2.2 Forecast Daily Traffic Flows on M6 Galway to Ballinasloe Scheme (Scheme only - Tolloed)

Location	AADT	
	2008	2028
Doughiska-Glennascaul	26,100	36,100
Glennascaul-Athenry	20,300	28,000
Athenry-Carrowkeel	15,500	21,300
Carrowkell-West Ballinasloe	10,800	14,900
West-Ballinasloe-East Ballinasloe	8,500	11,700
Loughrea link road	8,300	11,500

Source: Update on toll Study Traffic Flows, N6 Oranmore – East (RPS MCOS, August 2005)

2.3.4 Route Selection and Preliminary Design

The route selection process was divided into two sections (east and west of Glennascaul). Constraints and route selection studies and alignment design was carried out for each of the two sections.

Four routes were considered for the western section and five options for the eastern section. The principal drivers for the chosen corridors included:

- Avoidance of areas of archaeological and ecological importance;

- Travel time savings; and
- Accident reduction.

Four alternatives were considered for the location of the Toll Plaza. These were assessed in the traffic study (discussed in Section 2.3.3). The preferred location was chosen on the basis of the least proportion of traffic that would divert around the toll.

Once it became evident that the proposed M6 Galway to Ballinasloe Scheme would advance much more rapidly than the proposed Galway City Outer Bypass, approximately 5 km of dual carriageway was transferred from the latter scheme to the former.

A project appraisal on the M6 Galway to Ballinasloe Scheme was not carried out at route selection stage.

2.3.5 Project Appraisal

An economic evaluation of the scheme was undertaken in July 2004 using COBA by Jacobs Consultancy. The National Roads Authority produced Guidelines for Cost Benefit Analysis which were used in adapting the COBA application for use on the Irish road system.

A discount rate of 5% and a 30 year evaluation period from year of opening was examined. 2002 was the present value year used.

The output of the traffic model (discussed above) was used as an input to the economic evaluation. This included the forecast Annual Average Daily Traffic (AADT) for each section of road between junctions. The traffic figures used were based on the construction of the M6 Galway to Ballinasloe Scheme only with the inclusion of a toll.

The low and high traffic growth rates from the NRA Guidelines were used in the economic evaluation. The impact of reduced traffic volumes due to the imposition of a toll was not examined.

The estimated cost of the scheme at 2002 prices was €483m, excluding VAT (including the costs associated with construction, land, property and design). The costs of the scheme were compared to the forecast benefits which included time savings, vehicle operating costs and accident savings. The results of the economic evaluation identified a Net Present Value of €26 million with low traffic growth and €85 million with high traffic growth.

The results of the evaluation are shown in Table 2.3. For the high growth scenario, the Internal Rate of Return (IRR) is 6.1% and the Benefit to Cost Ratio (BCR) is 1.2. For the low growth scenario, these values are lower still with an IRR of 5.4% and a BCR of 1.1.

These levels are lower than seen on other comparable projects. Given the uncertainty associated with the estimates of costs and benefits, a small change in outcome (e.g. lower traffic volumes) could see the economic merits of the scheme being undermined.

Table 2.3 Results of Economic Evaluation (2002 Prices)

Period	Low	High
Present Value of Benefits €m	509.0	568.3
Present Value of Costs €m	483.1	483.1
Net Present Value €m	25.9	85.2
IRR %	5.37%	6.14%
Benefit to Cost Ratio (BCR)	1.054	1.176

Source: N6 Galway to East Ballinasloe Tolloed Option, COBA Appraisal Report (Jacobs Consultancy, July 2004)

Other than the two levels of traffic growth, there was no sensitivity analysis carried out (e.g. on scheme cost outcomes).

The economic appraisal of the scheme was not re-visited at tendering stage, when revised costs estimates and up to date traffic forecasts associated with the scheme were available.

2.3.6 Compliance with Procurement, EIS and other Statutory Requirements

An Environmental Impact Statement (EIS) was prepared for the M6 Galway to Ballinasloe Scheme in August 2004.

Procurement of the M6 Galway to Ballinasloe Scheme was via a Public Private Partnership (PPP) arrangement advertised in the OJEU in May 2005. The preferred tender was selected in July 2006 and the contract signed in December 2006.

All of the above processes satisfied the statutory procedures in place at the time.

2.3.7 Adequacy of Consultation Processes

The public were invited to take part in a number of consultation sessions. These consultations were carried out based on three separate sections: Doughiska to Glennascaul, N6 Galway to East Ballinasloe and N6 Ballinasloe to Athlone.

The consultations were advertised in the local and national press, on radio, display of notices in public venues and delivery of leaflets to households. The consultation sessions were attended by in excess of 5,000 people.

Following the selection of the Preferred Route, individual consultations took place with landowners directly impacted by the scheme. The design of the scheme was influenced by concerns raised by affected landowners.

The public were invited to make written submissions in relation to the contents of the EIS.

The EIS and CPO application were submitted to An Bord Pleanála in August 2004. A public oral hearing was held between November 2004 and February 2005. The scheme was approved in June 2005.

2.4 Scheme Implementation

2.4.1 Scheme Management Structures

The preliminary design of the scheme was carried out in accordance with the Design Manual for Roads and Bridges applicable at that time.

2.4.2 Scheme Schedule, Management and Costs

The M6 Galway to Ballinasloe Scheme was procured as a PPP. The scheme implementation in terms of the delivery of the scheme to the specification as set out in the PPP Contract, the management of the PPP Contract, the budget schedule, and the budget outturn are explored in detail in Section 5, where the performance of the scheme is reviewed in terms of anticipated outcomes.

2.5 Scheme Operational Performance

2.5.1 Traffic Outcomes on the New Road

The objectives of the scheme were to relieve traffic congestion in towns along the corridor such as Ballinasloe, Kilreekill, Loughrea, Craughwell and Oranmore, facilitate shorter travel times with associated cost savings, improve accessibility, contribute to a reduction of fatal accidents along the route and increase the potential for economic development.

The achievement of such objectives largely depends on the success of the scheme in attracting traffic to the scheme. In this context, the key question is whether the scheme has achieved the predicted level of traffic volumes.

The traffic study contains traffic predictions for 2008 and 2028 for the scheme. Interpolating between these dates yields the equivalent traffic predictions for the initial years of the scheme's operation. In addition, the traffic volumes used in the economic appraisal have been calculated based on initial traffic volume and growth rates.

Table 2.4 compares these predicted traffic levels with the actual volumes of traffic realised.

Table 2.4 Comparison of Forecast and Actual Traffic Volumes (AADT), 2010-2013 (Tolled Section)

	Economic Appraisal		Traffic Study	Actual
	COBA Low	COBA High		
2010	10,938	11,092	11,153	9,020
2011	11,175	11,412	11,334	9,182
2012	11,417	11,714	11,518	9,143
2013	11,664	12,080	11,705	9,208

Sources: Economic Appraisal (Jacobs Consultancy, Jul 2004); Traffic Study (RPS MCOS, Aug 2005); NRA traffic data

For the first four years of the scheme, the average traffic volumes using the scheme are up to 20% below the levels predicted in the traffic study, 19% below the levels used in the economic appraisal with low growth assumptions and 21% below the levels used in the high traffic growth economic appraisal.

This is a significant shortfall in traffic and could have a significant impact on realising the schemes objectives.

It is possible this shortfall could be explained by a larger than expected volume of traffic diverting around the tolled section. Table 2.5 compares the forecasted traffic volumes with the actual traffic volumes for the non-tolled section of the scheme to the east of Athenry.

Table 2.5 Comparison of Forecast and Actual Traffic Volumes (AADT), 2010-2012 (Non-Tolled Section, Loughrea to Athenry)

	Economic Appraisal		Traffic Study**	Actual
	COBA Low	COBA High		
2010	16,087	16,315	16,001	13,423
2011	16,435	16,786	16,257	13,788
2012	16,791	17,270	16,517	13,608

Sources: Economic Appraisal (Jacobs Consultancy, Jul 2004); Traffic Study (RPS MCOS, Aug 2005); NRA traffic data

A broadly similar shortfall is seen for the non-tolled section. This implies the shortfall is not due to diversion away from the toll but lower volumes of traffic using the scheme as a whole.

A study was carried out in November 2013 to assess the number of trucks that divert around tolls on selected schemes. The M6 Galway to Ballinasloe was one of these schemes assessed. The study was carried out by way of natural experiment. A 'toll holiday' was provided where heavy goods vehicles could use the tolled section with no payment required. This resulted in an 11% increase in the number of HGVs using the tolled section. This is not a level of diversion significant enough to explain the shortfall in forecast traffic volumes using the scheme.

Table 2.6 examines the share of traffic volumes by vehicle type.

Table 2.6 Share of Traffic by Vehicle Type, Forecast and Actual

	Motorbike, Car, LGV	HGV	Bus, Coach
Economic Appraisal	90.2%	9.1%	0.7%
2010 Actual	93.6%	5.1%	1.3%
2011 Actual	93.6%	4.9%	1.5%
2012 Actual	93.4%	4.9%	1.7%
2013 Actual	93.3%	4.9%	1.8%

Sources: Economic Appraisal (Jacobs Consultancy, Jul 2004); NRA traffic data

It is seen that the heavy goods vehicle (HGV) share of traffic volumes is significantly below the level forecast. The volume of traffic made up of light vehicles (motorbikes, cars and light goods vehicles) is higher as a share of total traffic but still well below the forecast level in absolute terms.

Overall the levels of traffic seen on the scheme are well below the levels forecast. The economic downturn is likely to have had a significant impact on this outturn.

2.5.2 Road Safety Outcomes

One of the objectives associated with the scheme was a reduction in the level of fatal accidents along the route. Research has indicated that, historically, motorways have proved to be seven times safer than two lane roads in general and three times safer than dual carriageways⁷.

In the period since the M6 Galway to Ballinasloe Scheme opened in December 2009 to the end of 2012, there were no serious or fatal collisions on the scheme. There has also been a notable reduction in serious and fatal collisions on the old route, primarily due to a reduction in traffic. Although only three full years of data is available, the reduction in both serious and fatal collisions along the corridor is very positive.

Table 2.7 Number of Serious and Fatal Collisions on New and Old Routes

	New M6		Old N6	
	Serious	Fatal	Serious	Fatal
2005	-	-	2	2
2006	-	-	1	1
2007	-	-	2	0
2008	-	-	3	2
2009	0	0	1	2
2010	0	0	2	0
2011	0	0	1	0
2012	0	0	1	0

Source: Road Safety Authority Collision Statistics

2.5.3 Overall Economic Return to the State

The M6 Galway to Ballinasloe Scheme is likely to deliver on a number of its objectives including reduce congestion in towns along the old route and contribute to a reduction in the number of fatal accidents along the route.

⁷ See: D O'Connell et al. Inter-urban Accident Rates by Road Type and Geometric Elements. Association of European Transport, 2004.

However, the significant shortfall in traffic volumes from the level forecast (circa 20%) raises serious questions over the economic return to the State. Given the low level of economic return forecast (BCR of 1.1) the current traffic volumes would not be adequate to realise a positive economic return from the scheme.

2.6 Summary

Since the opening of the M6 Galway to Ballinasloe Scheme, large volumes of traffic have used the motorway, and it has contributed to a significant reduction in the volumes of traffic in the towns and villages along the old N6 corridor and a reduction in overall traffic congestion.

The traffic volumes using the scheme to date are circa 20% below the levels predicted. Such a reduction in traffic volumes over the lifetime of the scheme would more than negate the predicted net economic benefits. The scheme would therefore have an overall net economic cost.

However, given the economic climate in Ireland during the scheme's first four years in operation, this performance is unlikely to be representative of the performance of the scheme over its full 30-year lifetime. It should also be noted that the M6 Galway to Ballinasloe Scheme is a key element of the Dublin to Galway interurban route. An economic assessment of the impact of this scheme in the context of the wider project could increase the level estimated benefits.

To date, the safety record of the bypass indicates that it is delivering the safety benefits associated with motorways in general.

The scheme was successfully planned and implemented. The preliminary design of the scheme was carried out in accordance with the Design Manual for Roads and Bridges applicable at that time.

The economic analysis was not updated prior to contract award, when revised cost estimates and traffic forecasts associated with a PPP procurement of the scheme were available. A revised CBA at the tendering stage now forms part of the NRA's Project Appraisal Guidelines, which addresses this shortcoming for all current/future schemes.

3 PPP Pre-Planning Review

3.1 Introduction

This section reviews the pre-planning steps completed by the NRA in progressing the M6 Galway to Ballinasloe Scheme as a PPP.

3.2 Background

A PPP is a partnership between the public and the private sector for the purpose of delivering a project. There is a sharing of project risks between the public and private sectors. A PPP project benefits from an accelerated implementation through the availability of private sector funding. This is particularly the case in situations of limited public finances, where access to private sources of funding allows the progression of projects that would not otherwise be possible.

A number of guidance documents have been published by the authorities with responsibility for implementing PPPs, since the first PPPs were procured in Ireland over ten years ago. A summary of some of the key PPP guidance documents is provided in Appendix A. There are a number of planning steps recommended when considering a scheme as a potential PPP.

3.3 PPP Scheme Selection

The *National Development Plan (NDP), 2000 - 2006* included an objective for the concentration of investment on the five strategic national roads linking the main urban areas in the country. The NDP confirmed the policy for PPPs on being the maximum usage of PPP consistent with the principles of efficiency and best value for money. Minimum targets for PPP private funding were included in the NDP, including 23% of the total €5.97 billion 2000 – 2006 road investment programme.

In mid-1999 the Government requested that the NRA examine a number of schemes to assess their potential as PPP schemes. The M6 Galway to Ballinasloe Scheme was announced as part of the NRA's Tranche II PPP roads programme in June 2000.

The NRA established certain key principles to guide its PPP road scheme selection analysis. These principles were as follows:

- The use of the PPP mechanism would not delay scheme delivery;
- An alternative toll-free route should be available for road users;
- Tolloed roads should be spread across the main national routes to create an equitable distribution of user-charging on the country's newly constructed road network;
- A road project needed to be a minimum of £30 million (€38m) in value in order to produce value for money when using the PPP process; and
- A public subsidy would be considered for high cost schemes which could not be solely financed from tolls.

When examined in terms of these principles, the NRA determined that the M6 Galway to Ballinasloe Scheme met the criteria as a potential PPP scheme.

3.4 Assessment of Shadow Bid Model

Prior to the commencement of the PPP tender process a Shadow Bid Model (SBM) was developed by the financial advisors (KPMG). The SBM included the following input information:

- Projected traffic and toll level information provided by the NRA's traffic advisors;
- Scheme costs provided by NRA and/or its technical advisers; and
- Financing assumptions in relation to debt, equity and economic assumptions.

The SBM was used to run a variety of financial scenarios which illustrated (or 'shadowed') how a private sector bidder might approach the scheme. The Shadow Bid Model is used to inform decisions in relation to the structuring of the transaction to be provided for in the tender requirement. An

overview of certain financial related tendering requirements as provided for in the M6 Galway to Ballinasloe PPP Scheme tender invitation documents are set out in the table below.

Table 3.1 Tender Requirements

Key Features of M6 Galway to Ballinasloe PPP Scheme Tender Requirements

- Construction and operational payments are available up to set limits and conditions
- Tenderers will be entitled to collect tolls for up to 30 years and are required to share a proportion of the toll revenue with the NRA based on traffic volumes. The option was available for tenderers to bid Variant Tenders with a 35 year concession period.
- The Tenderer will be subject to non-availability payments which will be payable by the Tenderer to the NRA
- The Tenderer will not be permitted to generate excessive returns from the project and therefore bids must include an increasing revenue share for the NRA as vehicle numbers increase.
- There are no traffic guarantees provided by the NRA

3.5 Value for Money (VFM) Assessment

The PPP planning guidance states that the decision to procure a project as a PPP should be based on a VFM assessment. This assessment compared the costs of procuring the scheme by traditional means (the Financial Comparator) with the equivalent costs of procuring the scheme by means of a PPP.

VFM comparisons were undertaken at various stages in order to ensure the continuing rationale for procuring the scheme through a PPP option. These stages are as follows:

- Following receipt of ITN Tenders;
- Following the receipt of an updated submission from the Provisional Preferred Tenderer; and
- Shortly before financial close (to reflect any material changes in the Provisional Preferred Tenderer)

Under the 2006 Department of Finance guidelines, formal VFM tests should also have been carried out to determine whether, and in what form, a PPP arrangement has the potential to offer the best value for money and at completion of the Public Sector Benchmark. Given the procurement process was underway when this guidance was published, it is understandable that these steps were not carried out.

A financial comparator was prepared as part of the Value for Money Assessment of the M6 Galway to Ballinasloe Scheme, which identified the costs of procuring the scheme using a traditional procurement approach.

It should be noted that tenderers were required to make their own traffic forecasts. In most cases, these were significantly higher than the NRA's estimate. In carrying out the Value for Money assessments, the NRA's traffic estimates were used to forecast revenue share payments. Using the NRA's traffic forecasts ensured a sound basis for the VFM and allowed all tenders to be compared on an equal footing.

3.6 Preparation of the Financial Comparator

The Financial Comparator (FC) consists of an assessment of the total costs that would be incurred in the provision of a scheme through a traditional procurement scenario in which the public sector retains managerial responsibility and exposure to risk. In preparing the FC for the M6 Galway to Ballinasloe Scheme, NRA Guidelines and Design Standards for road development were used, as was

the experience in preparing previous Financial Comparators by the NRA's specialist advisors i.e. technical (Jacobs Babbie) and financial (KPMG).

As per the Guidance, the costs included in the FC were as follows:

- Base costs: the public sector's estimate of the costs it would incur to construct, maintain and manage the infrastructure for the duration and to the specification of the contract, before allowing for contingencies or risks.
- Retained risks: these risks, by their nature, always rest with the public sector;
- Risk retained under traditional procurement, but transferred under PPP: an allowance for the additional costs to the public sector as a consequence of the risks associated with the project.
- Efficiency adjustments: allows for the public sector improving its performance in managing base costs and the impact of risks over the life of the project.

As per the guidance, the FC was prepared prior to the receipt of ITN Tenders, to ensure it represented the NRA's best estimate of the cost of delivering the services required under the PPP scheme without being influenced by knowledge of the private sector's actual proposals⁸.

3.7 Risk Assessment

In line with the Guidance, in preparing the FC, the risks capable of being quantified, that differed between the public and private sectors were assessed.

The approach to valuing of risk was based on a database of risk knowledge gained as part of the closing of six PPP deals, the preparation of nine financial comparators for previous PPP schemes, as well as information emerging from NRA schemes procured using Design and Build methods. The approach used was to assign a generic range of probabilities to each major risk category (Capital, Operational, Demand etc), on the basis of risk estimates from previous schemes. The probabilities were applied to the total cost estimates of each category to quantify the level of risk for the category as a whole.

Risks not amenable to quantification, but with the potential to influence the VFM assessment, were identified separately as part of the VFM assessment.

3.8 PPP Procurement Steps

Public Private Partnerships are a form of procurement and as such are subject to all the normal discipline applying to procurement generally, including Department of Finance procurement guidelines as well as EU Procurement Directives.

KPMG Corporate Finance, Jacobs Babbie and McCann Fitzgerald Solicitors provided advice to the NRA throughout the procurement process.

It is common in a procurement process to select two or more preferred tenderers and carry out a Best and Final Offer (BAFO) stage. Alternatively, a single tenderer can be selected as the Provisional Preferred Tenderer (PPT) to negotiate a contract with. In the case of this procurement procedure, a single tenderer was selected.

The procurement of the PPP scheme was conducted in an open and transparent manner, and in line with the relevant EU and national regulations.

3.9 Summary

The planning steps implemented by the NRA prior to procuring the M6 Galway to Ballinasloe Scheme as a PPP were reviewed and found to be in line with the official PPP implementation guidance. The relevant steps advocated in the guidance documents were implemented by the NRA.

⁸ Two Financial Comparator scenarios were modelled, one with public sector tolling and one without tolling

As set out in Section 2, the steps above would have been enhanced by the completion of a revised economic appraisal at the tendering stage. This would ensure explicit consideration would be given to updated cost/traffic projections relating to the scheme. As noted in Section 2, a revised CBA at the tendering stage now forms part of the NRA's Project Appraisal Guidelines, which addresses this shortcoming for all current/future schemes.

4 PPP Procurement Review

4.1 Introduction

This section includes a review of the VFM assessment undertaken to determine if the basis on which the decision was taken to procure the scheme as a PPP was appropriate.

4.2 Outcome of VFM Assessment

The VFM Assessment compared, over the lifetime of the scheme, the Net Present Value (NPV) of the Exchequer cash flows associated with the traditional procurement scenario, with the NPV of the Exchequer cash flows associated with the PPP procurement scenario.

Table 4.1 sets out, in summary format, the NPV of the NRA and Exchequer costs and revenues associated with both procurement options.

Table 4.1 Summary of Exchequer Costs of the Scheme

Financial Comparator (Traditional Procurement – with tolling)	NPV 000 €	PPP Option Preferred Tenderer	NPV 000 €
Base Costs (ex VAT)	433.9	Construction payments	135.6
Toll Costs (ex VAT)	82.7	Operational payments	137.0
Toll Revenue	(150.0)	Average Revenue Share (factored by 80%)	(0.9)
VAT on Costs	79.2		
Total Non-Risk adjusted cost to the NRA	445.8	Offer Price	271.7
Total Non-Risk adjusted cost to the NRA (ex VAT)	366.6		
Risks Retained Costs (ex VAT)	113.6	Retained Risks in either FC or PPP	5.9
Risks Retained Revenue (20% factor)	33.0		
VAT on Costs Risks	16.4		
Total Risk Adjusted Cost to the NRA	608.9	Total Risk Adjusted Cost to the NRA	277.6
Less incremental cash flows to Public Sector	(95.6)	Less incremental cash flows to Public Sector[^]	(41.9)
Total Risk Adjusted Cost to the Public Sector	513.3	Total Risk Adjusted Cost to the Public Sector	235.7

Source: Value for Money Assessment, M6 Galway to Ballinasloe Scheme, March 2007

[^]Rates (€3m), Tax (€3.4m) and VAT on non-recoverable receipts (€35.5m)

As set out in the table above, there were estimated net costs associated with the PPP option, totalling €236 million, compared to an estimated cost of traditional procurement totalling €513 million, a difference of €277 million.

The higher estimated public sector costs associated with the (tolled) Financial Comparator option relative to the PPP option resulted in the decision being taken to procure the scheme as a PPP.

A key reason for the significant difference between the traditional procurement and PPP options is the level of traffic growth used by the preferred tenderer. In compiling their bid, the preferred Tenderer used a traffic growth estimate of ██████ per annum. This compares with a growth level of 1.47% forecast by the NRA. The higher level of estimated traffic over the scheme's lifetime and therefore revenue payment from tolls resulted in low levels of construction and operation payments.

In compiling the VFM, NRA Traffic forecasts were used to determine the toll revenue attributable to the NRA from the scheme. The revenue was factored by 80%⁹ giving a net forecast of €120 million.

In the first four full years since the opening of the M6 Galway to Ballinasloe Scheme, the traffic levels using the scheme have been on average 22% below the level estimate by the NRA in the VFM. The realised toll revenue is therefore expected to be not significantly different from the level evaluated using the 80% factor.

The tenderer is likely to have suffered significant shortfall from the levels of income predicted. However, this risk rests with the tenderer.

The €277 million difference in total risk adjusted cost to the public sector between the PPP option and the Financial Comparator would be expected to increase should the traffic volumes continue to be in excess of 20% below the levels forecast by the NRA.

Therefore the cost reduction to the public sector in opting for a PPP over a traditional contract type remains substantial.

4.3 Review of Components of Financial Comparator

A detailed review was undertaken to determine if the individual cost and revenue items included in the Financial Comparator and PPP options represent accurate approximations of the costs and revenues attributable to the Exchequer under each procurement option. Full details of this review are included in Appendix B which can be summarised as follows:

- The total costs used in the Financial Comparator are 6% higher than the average total cost from the four tenders at ITN stage;
- The risk values associated with the FC scenario revealed that the cost risk values of €130 million (22% of total costs) are broadly acceptable; and
- Traffic volumes are significantly below the forecasts used to estimate Toll Revenue. However, an 80% factor was applied to Toll Revenue to account for the risk associated with uncertain incomes. Therefore Toll Revenue is likely to be marginally below the level used in the Financial Comparator increasing the €277 million difference in total risk adjusted cost to the public sector.

4.4 Summary

The NRA's decision to procure the M6 Galway to Ballinasloe Scheme as a PPP was based on a VFM Assessment. The results of the VFM assessment showed there were higher NRA costs to the order of €277 million associated with the Financial Comparator relative to the PPP option, which resulted in the decision being taken to procure the scheme as a PPP.

Following a detailed review of the components of the VFM assessment, it was determined that the net cost of the Financial Comparator was potentially underestimated. This is due to the significantly lower levels of traffic realised on the scheme once built.

⁹ With reference to Department of Finance findings regarding uncertain cash flows

The traffic volumes seen on the scheme to date are approximately 22% below the levels used in the VFM. A factor of 80% was applied to the toll revenues in the VFM.

The cost to the Public Sector remains substantially lower for the PPP option. Therefore the decision to procure the scheme as a PPP represented value for money for the Exchequer and was the appropriate decision for the scheme.

5 PPP Scheme Implementation Review

5.1 Introduction

This section reviews the implementation of the M6 Galway to Ballinasloe Scheme to date. The scheme's implementation is reviewed across three key criteria, as follows:

- **Timing:** A review of the time taken to complete the various stages of the scheme
- **Quality:** An analysis of whether the key elements of the scheme as per the project specification were achieved; and
- **Costs and Revenues/Traffic Volumes:** an analysis of the public sector costs associated with PPP scheme relative to initial estimates.

5.2 Timing of PPP Scheme Implementation

As part of its 2000 Best Practice Guidelines, the Department of the Taoiseach (DOT) stated that a PPP approach should be adopted wherever it would “*accelerate the implementation of a particular project*”. In the Framework for Public Private Partnerships - Working Together for Quality Public Service, published by the Social Partners in 2000, the principles underpinning the PPP programme were set out, including: “*PPPs should maximise the benefits of private sector efficiency, expertise, flexibility and innovation*”.

Table 5.1 and Table 5.2 set out the procurement and construction periods associated with the M6 Galway to Ballinasloe PPP Scheme.

Table 5.1 Procurement Timelines

Date	Task
Pre Qualification	
May 2005	OJEU Notice
ITN Tender Phase	
September 2005	Tender Invitation Documents Issued
May 2006	Submission of Tenders for Short Listing
Preferred Tenderer Phase	
July 2006	Preferred Tenderer Selected
November 2006	Receipt of Preferred Tenderer's Submission
April 2007	Contract Award
Road Opening	
December 2009	Road Opening

Source: NRA

Table 5.2 M6 Galway to Ballinasloe PPP Scheme Timelines

	No of Months
Start Procurement - end Procurement	23
Start Construction - end Construction	32
Start Procurement - end Construction	55

The procurement period, from date of first issue of the OJEU notice to contract award to the successful PPP bidder, totalled 23 months. The PPP contract was awarded to the successful bidder in April 2007. The motorway scheme was opened 32 months later, in December 2009.

It was not possible to identify equivalent procurement and construction timeframes for roads of a similar scale to the M6 Galway to Ballinasloe PPP Scheme¹⁰. As such, the review of the scheme's timeliness is restricted to a review of the targets set for the scheme. The motorway scheme was scheduled to be complete in April 2010. The actual motorway opening took place in December 2009, four months ahead of schedule.

The project was opened under a permit-to-use certificate. However, a number of outstanding works (including issues relating to safety barriers) delayed the final completion until August 2010. A supplemental agreement was entered into on this date for completion of the remaining works by December 2010 (later extended to January 2011). These works were completed as agreed.

5.3 Quality of PPP Scheme Implementation

In reviewing the PPP scheme's implementation, a number of key areas were reviewed:

- the delivery of the scheme to the specification of the PPP contract;
- the management procedures put in place by the NRA; and
- the contract management in the design, construction and operational phases.

5.3.1 Delivery of Key Element of the Scheme

The M6 Galway to Ballinasloe PPP Scheme was delivered in line with the contract specification. There have been limited issues relating to the quality of the scheme post completion that have not been addressed speedily by the concessionaire, in line with the terms of the contract. One issue of note is the design of approximately 20 drainage outfalls which required remediation work.

5.3.2 PPP Management by the NRA

The progression of the scheme was managed by a newly established PPP unit within the NRA. In line with published guidance, the NRA contracted legal, financial and technical advisers to assist with:

- the devising of an appropriate procurement mechanism;
- the drawing up of detailed contract documents; and
- assessing and selecting PPP consortia for the scheme.

To date, the management of the PPP scheme contract has run smoothly. The PPP Concessionaire, in line with its obligations, has provided the NRA with its reporting requirements, including: Winter maintenance reports; Annual reports; Annual performance reports; five yearly management plans; and Monthly O&M reports.

5.3.3 Contract Management during Design and Construction

The NRA contracted technical engineers to project manage the design and construction of the scheme on its behalf. Over the course of the construction period, the NRA was provided with a monthly construction period report.

5.3.4 Contract Management during Operation

The NRA's management of the operational phase of the PPP contract has operated on the same basis as the design and construction phase, namely technical support has been contracted in as required. NRA staff members are allocated supervisory roles for individual PPP schemes. As part of

¹⁰ Such a comparison would be possible if the schemes in the PPP programme were compared to a sample of similar non PPP road schemes.

this supervisory role, the NRA staff member is responsible for reviewing the reports provided by the PPP Concessionaire, making on-sites visits to the scheme and administering the contract.

5.4 Outturn Cost of PPP Scheme

One of the key principles underpinning the implementation of PPP infrastructure projects in Ireland is the obtaining of better Value for Money for the NRA and the Exchequer. The Department of Finance PPP Implementation guidance (see Appendix A) stated that Ex-Post Reviews of PPP Schemes should contain a comparison of the actual PPP outturn costs (as provided for in the PPP contract¹¹) with the initial estimated costs of the scheme (as set out in the Financial Comparator).

The actual PPP outturn cost to the Exchequer is identified in the PPP contract and as such, the PPP outturn cost remains unchanged except where:

- any variation costs are potentially introduced after financial close; and/or
- the revenue share/royalty payments payable from the PPP scheme are different to those estimated in the tender evaluation process.

The estimated NRA costs associated with the preferred PPP option totalled a net cost of €278 million (see Table 4.1).

Arising from various variations relating to the works requirements an additional payment of €16 million was made by the NRA to the PPP Concessionaire.

Since the signing of the PPP contract with the concessionaire there have been no revenue share payments arising from the PPP scheme as expected.

5.4.1 Traffic Levels

Table 5.3 and Figure 5.1 below set out a comparison of the NRA traffic forecasts used as part of the VFM Assessment process and the actual traffic volumes which have materialised since the opening of the scheme in December 2009.

¹¹ The actual costs incurred by the PPP Concessionaire in providing the infrastructure and services as per the specification incorporated into PPP contract is unknown, because the Concessionaire is not required to provide this information to the NRA. The outturn cost data that is available relates to the estimated outturn NRA costs associated with the PPP Contract, as signed by the Concessionaire at Financial Close. This cost estimate incorporates any agreed contributions to construction and operational costs payable by the NRA to the Concessionaire less any revenue share/royalty payments payable to the NRA.

Figure 5.1 : Forecast NRA and Actual Traffic Volumes (Source: NRA)

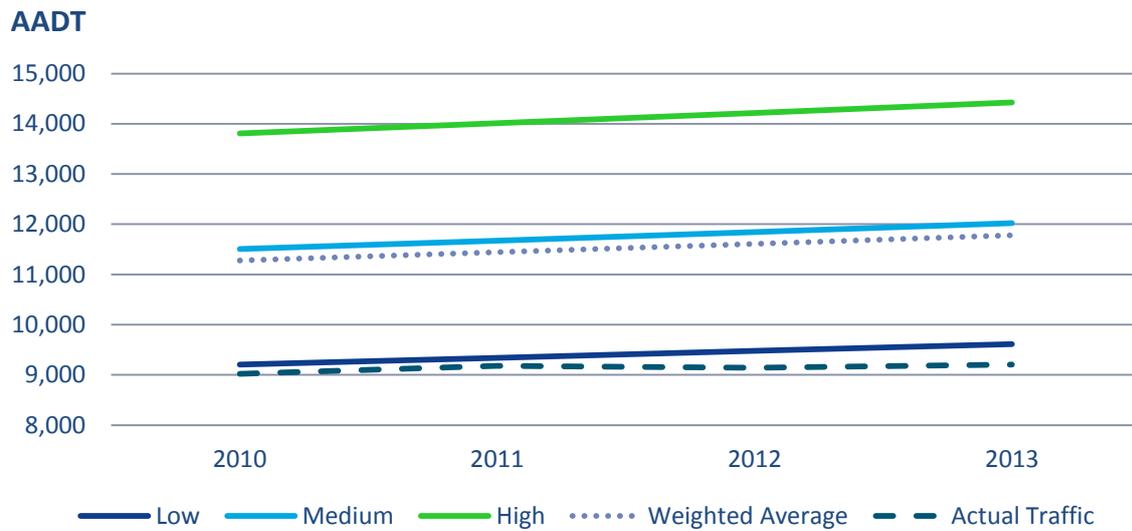


Table 5.3 Forecast NRA and Actual Traffic Volumes

Year	Low	Medium	High	Weighted Average	Actual Traffic	% difference (Med & Actual)	% difference (WA & Actual)
2010	9,204	11,505	13,806	11,275	9,020	-21.6%	-20.0%
2011	9,339	11,674	14,009	11,441	9,182	-21.3%	-19.7%
2012	9,476	11,845	14,215	11,608	9,143	-22.8%	-21.2%
2013	9,615	12,019	14,424	11,779	9,208	-23.4%	-21.8%

Source: NRA

¹Weighted Average is composed of 25% Low Forecast, 60% Medium Forecast, 15% High Forecast

As Table 5.3 highlights, aggregate traffic volumes annually have been below the low traffic forecasts since the opening of the M6 Galway to Ballinasloe in December 2009. In the first four full years of operation, the traffic levels were, on average, 22% below the medium projection. In 2013, it was over 23% below.

The VFM assessment estimated 7.65% of traffic would be heavy goods vehicles (HGVs). Since opening, the M6 Galway to Ballinasloe Scheme has seen heavy vehicles share of approximately 5%.

Therefore it can also be concluded the vehicle shares used in the VFM have not been realised.

Table 5.4 Heavy Goods Vehicles (HGVs) as a Proportion of all Vehicles

Year	Heavy Goods Vehicles (HGV) as a Proportion of all Vehicles
VFM	7.65%
2010 Actual	5.15%
2011 Actual	4.86%
2012 Actual	4.89%
2013 Actual	4.90%

Source: NRA

5.4.2 Revenue Share Payments

The traffic volumes in the initial years of the motorway opening have resulted in no revenue share payments being made to the NRA. This is as expected.

5.4.3 Implications for Total Outturn Cost associated with PPP Option

As set out above, initial traffic levels using the M6 motorway have been significantly below the levels forecast as part of the Value for Money assessment process. The growth assumptions used in the VFM are examined against current NRA guidance in Table 5.5 below.

Table 5.5 Growth Assumptions Used in Value for Money (VFM) and Current Guidelines

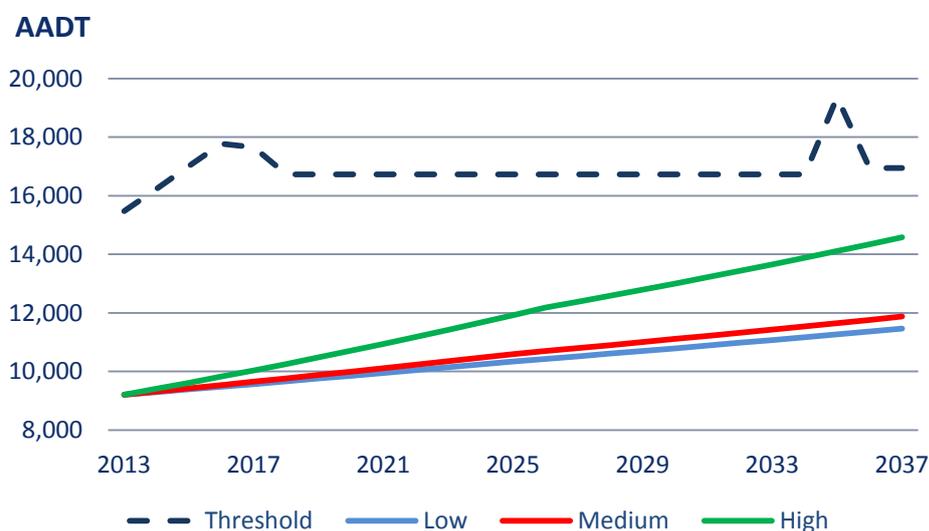
	2010-2025		2026-2036		2037-2040	
	PAG	VFM	PAG	VFM	PAG	VFM
Low	1.0%	1.5%	0.9%	1.5%	0.9%	1.4%
Medium	1.2%	1.5%	1.0%	1.5%	1.0%	1.4%
High	2.2%	1.5%	1.6%	1.5%	1.6%	1.4%

Source: Tender Evaluation Final Report, M6 Galway to Ballinasloe, October 2006 and NRA Project Appraisal Guidelines (PAG), Unit 5.5 Link-Based Traffic Growth Forecasting (January 2011)
Assumes 5% of traffic are HGVs

It is clear that the growth rates used in the VFM process are higher than the current NRA guidance for the West region in which the scheme is located.

The traffic levels have been forecast using the traffic volumes in 2013 and the current NRA Project Appraisal Guidelines for traffic growth. The results are shown in Figure 5.2.

Figure 5.2 Traffic Forecast (based on PAG growth rates) and Threshold for Revenue Share



Source: AECOM Estimates

It can be seen that the forecast traffic volumes are much lower than the threshold at which a revenue share is payable. It is therefore highly likely that there will be no revenue share payments paid to the NRA over the lifetime of the project.

Therefore the €0.9 million NPV which was estimated as part of the VFM assessment is unlikely to be realised.

5.5 Summary

The M6 Galway to Ballinasloe Scheme's implementation was reviewed in terms of the timing of the scheme, the quality achieved by the scheme and the actual materialised costs of the scheme against initial estimates.

The construction of the scheme commenced in April 2007 and the scheme opened in December 2009, four months ahead of schedule.

The scheme was delivered in line with the specification set out in the concession contract with the exception of a €16 million settlement payment made from the NRA to the PPP Concessionaire. There have been no substantial issues relating to the quality of the scheme post completion that have not been addressed by the concessionaire, in to an acceptable standard.

Since the opening of the M6 Galway to Ballinasloe Scheme, the traffic volumes using the motorway have been significantly lower (circa 22%) that those forecast as part of the VFM assessment process. As expected, there have been no revenue share payments.

Due to the high traffic growth forecasts estimated by the tenderer, the threshold at which a revenue share is paid is well in excess of the likely traffic volumes. The revenue share of €0.9 million (NPV) which was estimated as part of the VFM assessment (which included a 20% reduction) is unlikely to be realised.

6 Summary and Conclusions

In general, the M6 Galway to Ballinasloe Scheme was adequately planned both in terms of the statutory procedures, route selection and consultation and the planning undertaken in relation to the decision to procure the scheme as a Public Private Partnership (PPP).

During the implementation of the scheme, the appropriate management procedures adopted were satisfactory and in line with best practice guidance at the time. The implementation of the scheme as a PPP resulted in the scheme being delivered ahead of schedule and in line with the quality specified in the PPP contract.

The scheme has delivered on many of its objectives with the resultant benefits and outcomes. The scheme has helped to reduce traffic volumes and congestion in towns along the old N6 route, reduced the numbers of fatal accidents and contributed to providing a continuous motorway route linking Dublin to Galway.

Although an economic appraisal was carried out, this was done three years prior to the contract being awarded and over five years prior to the scheme opening. In the interim, there was no re-appraisal to account for changes in cost and traffic forecasts.

The appraisal approach adopted was in line with the available guidance at the time and a revised cost-benefit analysis at the tendering stage now forms part of the NRA Project Appraisal Guidelines. This addresses this shortcoming for all current/future scenarios.

The traffic levels that are using the scheme are approximately 20% lower than those used in the economic appraisal. Such a reduction in traffic volumes over the lifetime of the scheme would more than negate the predicted net economic benefits (which were relatively modest). The scheme would therefore be an economic cost to the State.

A value for money (VFM) study was carried out prior to awarding the contract. This included a comparison of traditional procurement with Public Private Partnership (PPP). This study estimated a reduction in risk adjusted costs to the public sector of €235 million which is approximately €277 million below the cost under traditional procurement.

The PPP contract was structured to ensure the majority of traffic risk rested with the private sector. As a result, the traffic shortfall (a reduction of 22% from what was used in the VFM) is primarily a cost to the private sector.

It is therefore considered that the decision to procure the scheme as a PPP represents value for money for the Exchequer.

As the private sector is liable for the majority of the financial implications of the reduced traffic volumes, the public sector is not significantly impacted. However, the overall economic merits of the scheme are questionable given the current traffic volumes.

It should be noted that the first four full years of operations of the scheme (2010-2013) have seen a significant economic slowdown in Ireland and are not likely to be representative of the full 30-year lifetime. Therefore the scheme may provide a positive overall economic return over its full lifetime.

Appendix A: Overview of PPP Guidance

Developing the Infrastructure Requirements of the National Development Plan: Best Practice Guidelines for Project Implementation, Department of the Taoiseach, 2000

As part of its 2000 Best Practice Guidelines, the Department of the Taoiseach (DOT) stated that a public private partnership approach should be adopted wherever it would accelerate the implementation of a particular project and represent better value for money over the full life cycle of the project. The DOT also stated that the most appropriate form of PPP (ranging from design and build to design, build, finance and operate) should be adopted having regard to the particular circumstances of the individual project.

Framework for Public Private Partnerships, Working together for Quality Public service. 2000

In 2000, a framework document endorsed by IBEC, ICTU, CIF, the Department of Finance and the Departments and Agencies engaged in the PPP process was published by the Social Partners. In the Framework a clear statements of the principles underpinning the PPP programme were set out, namely:

- PPPs should yield value for money for the Exchequer;
- PPPs should allocate risks to the party best able to control and manage them; and
- PPPs should maximise the benefits of private sector efficiency, expertise, flexibility and innovation.

A Policy Framework for Public Private Partnerships (PWC), DOEH&LG 2000

In 2000, the then Department of Environment, Heritage and Local Government commissioned PWC to produce a framework within which PPP projects could be advanced in the roads, water and waste sectors. The resultant Policy Framework detailed policy guidance covering each stage in the development, implementation and management of PPP projects. Some of the key guidance points identified in the resulting policy framework document include:

- **Market soundings** should be undertaken to determine the level of interest among the private sector and the capability of the private sector market to undertake prospective PPP projects.
- An **Output Specification** should be prepared which defines the services required by the public sector which the private sector would be responsible for providing as part of a PPP project. The actual design of the works necessary to deliver that service would be left to the successful private sector tenderer.
- A key driver of the PPP programme is the desire to increase **Value for Money (VFM)** in infrastructure procurement. To ensure that value for money is achieved, the Contracting Authority should be able to demonstrate that the option selected offers better value for money than the alternatives. The VFM assessment should not be seen as a single step but one that is carried through the life of the project. An initial PPP Assessment should be completed at the Option Appraisal stage to determine the potential for a PPP to deliver improved value for money compared with a traditional procurement. The final VFM assessment can only be made at the conclusion of the procurement process.
- In the case of projects where the public sector is the sole or main purchaser, the VFM undertaken at the end of the procurement process should comprise two key elements:
 - Monetary comparison – a comparison of the cost of the preferred Public Private Partnership tender, with the cost of traditional public sector procurement (the Financial Comparator), expressed in terms of discounted cashflows over the life of the PPP contract; and
 - Non-monetary comparison – a comparison of all the factors that are difficult to quantify in monetary terms, but their value to government and the wider public is significant. Examples include speed of project delivery, quality of service, and security of supply.
- One of the principles underlying PPPs is that risk should be allocated to the party best able to manage it. A detailed **risk assessment** should be undertaken for every PPP project.

- Central and Contracting Authorities will need to retain legal and financial advisers, as well as technical specialists, especially for Design, Build, Operate and Finance contracts and Concession contracts.

Policy Framework for Public Private Partnership (PPP) in Ireland: Project Implementation in the Local Government Sector, DOEHLG, Nov 2003

In 2003, the then Department of Environment, Heritage and Local Government published a policy framework document to guide the local government sector in the implementation of PPPs. The guidance highlighted the steps which all public projects must follow to ensure that the projects are properly examined and assessed, that the necessary statutory and administrative approvals are obtained, and that the procurement process is carried out in an efficient manner. It also highlighted the PPP specific tasks in relation to those steps, as follows:

- Project Identification – on the basis of an established business case/need for a project, the project receives the approval of a Sanctioning Authority. If a PPP approach is being considered some **market soundings** may be carried out to establish if there is market interest in the project.
- Option appraisal – during this phase various options for carrying out the project are examined, if the preferred option is a PPP, a PPP assessment report is completed which: determines the form the PPP will take; and establishes the **optimum allocation of risk** between public and private sector. Stakeholder consultation is carried out as part of a PPP Assessment Report. If the PPP procurement route is chosen, Department approval is sought before a Project Auditor is chosen, external advisors appointed, and a project steering group established.
- Statutory processes – the LA is responsible for preparing the project to go to procurement, including ensuring that the various planning and land acquisition and access consents are obtained.
- Pre-procurement - a **Public Service Benchmark (PSB)** cost is prepared, Departmental approval is sought for the project to go to procurement and an affordability cap is set based on the PSB.
- Procurement – the project is taken through the procurement process, when completed a tender recommendation report is submitted, and Departmental approval is sought to go to construction.
- Construction and operation – the contractor commences construction, variations may need to be referred to Department. When the LA is satisfied with the infrastructure provided, it signs off on the project and the operational contract commences.
- **Review of the PPP Process** – the performance of the project is reviewed
- Expiry of Contract

The Review of the PPP Process refers to the review of the performance of the project. As part of the policy framework document, the DOEHLG identified the objectives associated with the post project review of PPPs as follows:

- provide data on costs as an input to assessments (Public Sector Benchmarks) of subsequent PPP projects;
- provide public authorities with information on the economic benefits, or otherwise, of the PPP approach over alternative procurement approaches;
- identify the strengths and weaknesses in the systems in place for managing PPP projects.

It was noted that the Review of PPPs should contain the following:

- a brief description of the project;
- an outline of the project history with key decisions /events highlighted;
- a variance analysis of the final outturn costs of the project compared against initial estimates, the PSB, Affordability Cap and the Final Contract price;

- an analysis of the time taken to complete different stages of the project compared with projections; and
- the extraction of selected costs for the Department's database of costs on PPP projects.

Guidelines for the Provision of Infrastructure and Capital Investments through Public Private Partnerships: Procedures for the Assessment, Approval, Audit, and Procurement of Projects, 2006, Department of Finance

The Department of Finance (DOF) 2006 Guidelines for the Provision of Infrastructure and Capital Investments through Public Private Partnerships replaced Interim Guidelines published by the DOF in July 2003. The 2006 DOF Guidelines identified four distinct strands or functions associated with PPP projects as follows: the project appraisal function, the approval function, the procurement function and the audit function. Best practice would require an appropriate separation of functions between these strands.

1. The Sponsoring Agency is responsible for appraising projects. As part of the Detailed Appraisal, the Sponsoring Agency should determine the most appropriate procurement mechanism and, if a PPP approach is being considered, a PPP Procurement Assessment should be carried out.
2. Following appraisal of the proposed project, the Sponsoring Agency should approach the Sanctioning Authority for approval to proceed with the procurement of the project as a PPP.
3. PPP projects must be procured in line with all regulatory and EU procurement requirements in regard to tendering and bid evaluation.
4. There is a particular audit requirement in regard to PPP which is additional to the requirements outlined in the *Capital Appraisal Guidelines*, i.e. the appointment of a Process Auditor. A Process Auditor must be appointed for all PPP projects or grouped PPP projects where the capital cost is in excess of, or is likely to exceed, the limit specified by the Department of Finance (then €20 million).

Some of the key guidance points identified in the DOF 2006 Guidelines include:

- **Affordability:** A Sanctioning Authority should not allow a project to proceed unless it is satisfied that the overall capital cost of the project as a whole, including both PPP and non-PPP elements, can be accommodated within the Capital Envelope allocation(s) available to the Sponsoring Agency.
- **Value for Money:** VFM needs to be considered at two levels:
 - The overall VFM of the project – i.e. does the project as a whole offer good value for money; and
 - The VFM of the PPP contract – i.e. do the aspects of the project that are being procured by PPP represent good value for money, particularly when compared with the cost of achieving the same objective by traditional procurement (as represented by the Public Sector Benchmark (PSB)).

Four formal VFM tests should be carried out at the following points:

1. at PPP Procurement Assessment – a test carried out to determine whether, and in what form, a PPP arrangement has the potential to offer the best value for money solution for the procurement;
2. at Completion of the Public Sector Benchmark (PSB) – to determine whether, in light of the quantifications in the PSB, the conclusion reached in the PPP Procurement Assessment still holds;
3. at Tender Evaluation stage - to compare the highest ranking bid against the PSB, to assess whether the highest ranking bid offers a potential value for money solution; and
4. at Financial Close – a final test carried out (a) to assess the impact of any changes in the interest rate and/or discount rate and (b) where the project has been procured using the

Negotiated Procedure, to examine the effect of any proposed changes in the contract terms.

- The Sponsoring Agency should draw up a detailed **Output Specifications** for the project, focusing on outputs rather than inputs.
- A **Public Sector Benchmark (PSB)** - a comprehensive estimate of the cost (including risk valuations) of procuring those elements of the project that the private sector is to be invited to tender for in the PPP contract - is derived from the Output Specifications. The final PSB cost should be expressed in Net Present Value (NPV) terms, thereby reflecting the time value of money. The Output Specifications and PSB should be finalised and should be up to date before any tender invitations are issued.
- In any procurement competition, all of the tenders received are first examined to determine whether they are "suitable" bids. Having identified the highest ranking bid received, the next step is to examine the value for money of that bid.
- As part of a **Post Project Review** a comparison of the actual outturn costs of the project (as provided for in the contract) with the initial estimated costs (as set out in the PSB) should be undertaken and recorded. A Post Project Review aims to draw lessons for the future and, therefore, any significant lessons learned from the review should be translated into changes in the Sponsoring Agency's project practices. Each Sponsoring Agency should maintain a cost database which should be used when benchmarking costs for future projects and in the compilation of future Public Sector Benchmarks. The post project review exercise should be used to inform and update this database with the latest available information. In addition, each sector should maintain a sector-specific risk database.
- In many instances, a PPP contract will include clauses that link payment to performance of specific obligations under the contract. In order to ensure that the full benefit is derived from these clauses, it is essential that the performance of the private sector partner is constantly monitored over the contract term and that these clauses are invoked, as appropriate.

Appendix B: Review of Components of Financial Comparator

As previously identified, the cost and revenue items comprising the net NRA costs under the PPP scenario were not determined by the NRA, rather they were determined by the PPP Concessionaire on the basis of the Concessionaire's own estimates of the costs and toll revenues they would likely incur in providing and maintaining the infrastructure. The analysis below is thus restricted to reviewing whether the costs and revenues comprising the Financial Comparator were reasonable approximations of the costs and revenues attributable to the NRA under a traditional procurement scenario.

There are three core elements comprising the net NRA costs associated with the traditional procurement (Financial Comparator) scenario. These are namely:

- overall construction, operational and lifecycle costs associated with constructing and operating the scheme (including the road and tolling facility);
- values assigned to the risks (both cost and revenue) assumed by the NRA; and
- the revenue from tolls.

The assumptions used in the VFM assessment with respect to each of these components are reviewed in Sections B1 – B3 below.

B1 Construction, O&M and Lifecycle Cost Estimates used in FC

The costs for each element as estimated in the original Financial Comparator (at ITN stage) are compared to the estimates provided by the five shortlisted ITN bidders in Table B1 below.

Table B1 Base Tender Costs and per Pre-Tender Estimate (2006 prices)

	Capital Construction (€m)	O&M (€m)	Lifecycle (€m)	Other Costs (€m)	Total (€m)
Non Risk adjusted Pre-tender estimate	336	126	51	0	513
Tender 1	■	■	■	■	419
Tender 2	■	■	■	■	449
Tender 3	■	■	■	■	523
Tender 4	■	■	■	■	550
Average of Tenders	322	94	32	38	485

Source: M6 Galway to Ballinasloe PPP Scheme, Tender Evaluation – Final Report, Technical Evaluation (October 2006)¹²

On the basis of the data provided in Table B1, it is concluded that on aggregate, the overall cost estimates used in forming part of the Financial Comparator at ITN were in keeping with the tenders received being more expensive than two and less expensive than two. The total costs used in the pre-tender estimate exceed the average total cost from the five tenders by 6%.

¹² It should be noted that the pre-tender estimate figures presented in Table B1 represent the construction, O&M and lifecycle cost estimates at ITN stage (presented in nominal terms), and are thus not directly comparable to the Base Cost total presented in Table 4.1 which relate to the NPV of construction, O&M and lifecycle costs forming the FC at the final offer stage

B2 *Review of Risk Cost and Revenue Estimates in FC*

Risk analysis formed an important element of the VFM assessment process. The approach to valuing of risk was based on a database of risk knowledge gained as part of the closing of six PPP deals, the preparation of nine financial comparators for previous PPP schemes, as well as information emerging from NRA schemes procured using Design and Build methods. The approach used was to assign a generic range of probabilities to each major risk category (Capital, Operational, Lifecycle etc), on the basis of risk estimates from previous schemes. The probabilities were applied to the total cost estimates of each category to quantify the level of risk for the category as a whole.

Cost Risk

As set out in Table B2, the major *cost* risks retained by the NRA under the traditional procurement FC scenario related to: construction risks, which totalled circa €95 million or 25% of the total base construction costs; operating cost risks which totalled €9 million or 15% of the total base operating costs; and whole life cost risks totalling €6 million or 11% of the scheme's whole life costs. The total cost risk value, which totalled €130 million or 22% of the total estimated scheme costs, is considered to represent a broadly standard estimation of cost risks, in light of the history of cost overruns in previous road schemes.

Demand Risk

As part of the Financial Comparator, the forecast value of total Toll Revenue was estimated having recourse of the traffic forecasts. The value of demand risk is estimated based on 20% of Toll Revenue. In addition, there is a 2% demand risk associated with violations and/or operational losses. The total demand risk is €33.0 million.

Table B2 Overview of Cost Risks in Financial Comparator

Risk Category	Overview of Risk Type	Allocation of Risk	€m (% of Relevant Base Costs)	Total Risks
Capital	Risks relating to construction including roadway and toll	FC – all retained by NRA PPP – all transferred to PPP Co	95.4 (25% of base construction costs)	
Operating	Risks relating to operation and maintenance include the risks of estimation errors, service non availability, inflation, third party claims	FC – all retained by NRA PPP – all transferred to PPP Co	9.4 (15% of base operating costs)	
Lifecycle	Risks relating to a poorer than expected performance of key construction elements and/or materials	FC – all retained by NRA PPP – all transferred to PPP Co	5.7 (11 % of base lifecycle costs)	
Tolling	Risks relating to operating and lifecycle costs	FC – all retained by NRA PPP – all transferred to PPP Co	9.8 (10% of base tolling related costs)	
Total Cost Risk				130.0
Revenue	Risks relating to the uncertainty associated with the estimation of future traffic levels (80% factor - €30m) and violations/operational losses risk (€3m)	FC – all retained by NRA PPP – all transferred to PPP Co	33.0 (22% of total revenues)	
Total Revenue/Demand Risk				33.0

Source: Financial Comparator as shown in Value for Money Assessment, M6 Galway Ballinasloe PPP Scheme, March 2007

B3 Review of Toll Revenues in Financial Comparator

The key determinants of the estimated NRA toll revenues in the FC scenario were the forecast traffic volumes using the new motorway infrastructure.

Traffic Volumes

Since the opening of the M6 Galway to Ballinasloe Scheme the traffic levels using the motorway have been significantly below the levels forecast (circa 22%). Therefore, the realised toll revenue is likely to be below the forecast amount (which applied a factor of 80% i.e. a contingency for a 20% shortfall).

The €277 million difference in total risk adjusted cost to the public sector between the PPP option and the Financial Comparator would be expected to increase should the traffic volumes continue to be in excess of 20% below the levels forecast by the NRA.

Therefore the cost reduction to the public sector in opting for a PPP over a traditional contract type remains substantial.

Appendix C: Technical Note on Public Sector Benchmark

The following is an extract from the Technical Note on the compilation of a Public Sector Benchmark for a Public Private Partnership Project published by the Department of Public Expenditure and Reform which outlines current policy relating to disclosure of the Public Sector Benchmark.

“1.15 Disclosure of the Public Sector Benchmark

Current policy is that the PSB, or any elements thereof, is / are not made public during the tendering process on the basis that revealing the amount that the State is willing to pay may give tenderers an opportunity to increase their asking price above what they might otherwise seek. Where the public sector is likely to procure a similar project in the same or other sectors in the foreseeable future, the PSB (or any elements thereof) should not be released, even after the completion of the tendering process.

In the case of a once-off project, where it is not likely that there will be any similar procurement in the future, the release of the PSB after the contract has been signed could be considered, subject to the non-disclosure of risk valuations (see below). However, before releasing any of the PSB documentation, the Sponsoring Agency must be satisfied that none of the information being released could diminish the potential to secure value for money bids when procuring future projects.

If the Sponsoring Agency is satisfied that it is in order to disclose the PSB, it must advise the Sanctioning Authority of its intention to do so and of the basis for disclosure.

In no circumstances should the individual risk valuations set out in a PSB be disclosed and no information should be released in a format that would permit the identification of risk values. To do so would provide information on how the public sector values risk, which would prejudice the ability of the public sector to secure value for money in current and future projects through risk transfer. Similarly, it is important to ensure that information relating to the demand projections used in the development of a PSB for a Concession project (e.g., the Sponsoring Agency’s traffic forecasts for a toll road) is not disclosed.

Disclosure of any aspect of the PSB could have an adverse effect on the conduct by the Sponsoring Agency of PPP contract negotiations, particularly as information contained in the PSB could disclose positions taken in past or current negotiations and, indeed, positions that may be taken in future negotiations. Disclosure of the PSB, or elements thereof, may also give rise to an unwarranted loss to the Sponsoring Agency and/or an unwarranted gain to the private sector as access may be given to financial, commercial, industrial, scientific or technical information that belongs to the Sponsoring Agency.

The PSB, like other confidential and similar information relating to projects, is of course available to the Comptroller and Auditor General for inspection in connection with any reports his / her office may be progressing.”

M7/M8 Portlaoise to Cullahill/Castletown

Post Project Review



December 2014

Erratum Sheet

Post Project Review reports - Corrections

The Post Project Review reports were not originally intended for an external audience. There are in some cases errors in the reports with such errors ranging from typographical errors to in a small number of cases incorrect statements or errors in interpretation of the data (which have been identified as a consequence of subsequent reviews). We suggest that the following errata are taken into account when reviewing these reports.

4 PPP Procurement Review page 16

Table 4.1 details the value for money assessment at Best & Final Offer Stage (BAFO). This value for money assessment was prepared prior to financial close based on the tender received which had an Offer Price c.€48.5m in NPV terms. The NPV at Financial Close was c.€63m (Construction Payments increased by c.€14m in NPV terms to reflect interest rate changes between BAFO Offer and Financial Close). Value for Money of the tender offer adjusted for interest rate changes was confirmed to the NRA prior to close.

Important Notice

This report has been prepared by AECOM Limited. It is based on information and explanations provided by the National Roads Authority and has been prepared for the sole use of the National Roads Authority.

This Post Project Review report contains certain information of a commercially sensitive nature and should be kept confidential. This report contains information relating to tenderer's pricing and contains information on the Public Sector Benchmark. The PPP Guidelines (Technical Note on the compilation of a Public Sector Benchmark for a Public Private Partnership Project¹) published by the Department of Public Expenditure and Reform require public bodies to keep information relating to the Public Sector Benchmark confidential. This PPR report contains information relevant to the State's approach to evaluation of value for money in PPP competitions that the State may adopt in its future PPP competitions. Release of certain information contained in the Post Project Review report, whether on foot of freedom of information request or otherwise, would likely impact negatively on the State's commercial interests and would accordingly, not be in the public interest. In the event the recipient receives any request to disclose any information contained in the Post Project Review report (whether pursuant to freedom of information legislation or otherwise), we would ask you to notify the National Roads Authority of this request prior to any disclosure being made so that our comments may be taken into account in any decision that might be taken in this regard.

¹ Appendix C contains an extract from the Technical Note on the compilation of a Public Sector Benchmark for a Public Private Partnership Project which outlines current policy relating to disclosure of the Public Sector Benchmark.

M7/M8 Portlaoise to Cullahill/Castletown

Post Project Review

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Appendix A: Overview of PPP Guidance

Appendix B: Review of Components of Financial Comparator

Appendix C: Technical Note on Public Sector Benchmark

Executive Summary

The M7/M8 Portlaoise to Cullahill/Castletown PPP Scheme includes 40 km of standard two-lane motorway and associated junctions and link roads forming part of the N7 Dublin to Limerick route and the N7/N8 Dublin to Cork route.

Procurement of the scheme commenced in September 2005 with the contract awarded in June 2007. The scheme opened in May 2010 four months ahead of schedule.

The scheme has delivered on its objectives and the expected benefits and outcomes have materialised. The scheme has helped to reduce traffic volumes and congestion in towns along the old N7 and N8 routes and contributed to providing a continuous motorway route linking Dublin to Cork and Limerick.

The economic appraisal of the scheme was published in 2004 and demonstrates a strong economic case for the scheme. Current traffic levels using the scheme are 13% lower the forecast levels used in the Economic Assessment. However, even if this trend should continue, the scheme will deliver a positive economic return due to the strength of the economic case for the scheme.

The decision to procure the scheme as a PPP has been reviewed and is found to represent value for money for the Exchequer.

Overall, the scheme was adequately planned in terms of the statutory procedures, appraisal, routes selection and consultation and the planning undertaken in relation to the decision to procure the scheme as a Public Private Partnership (PPP).

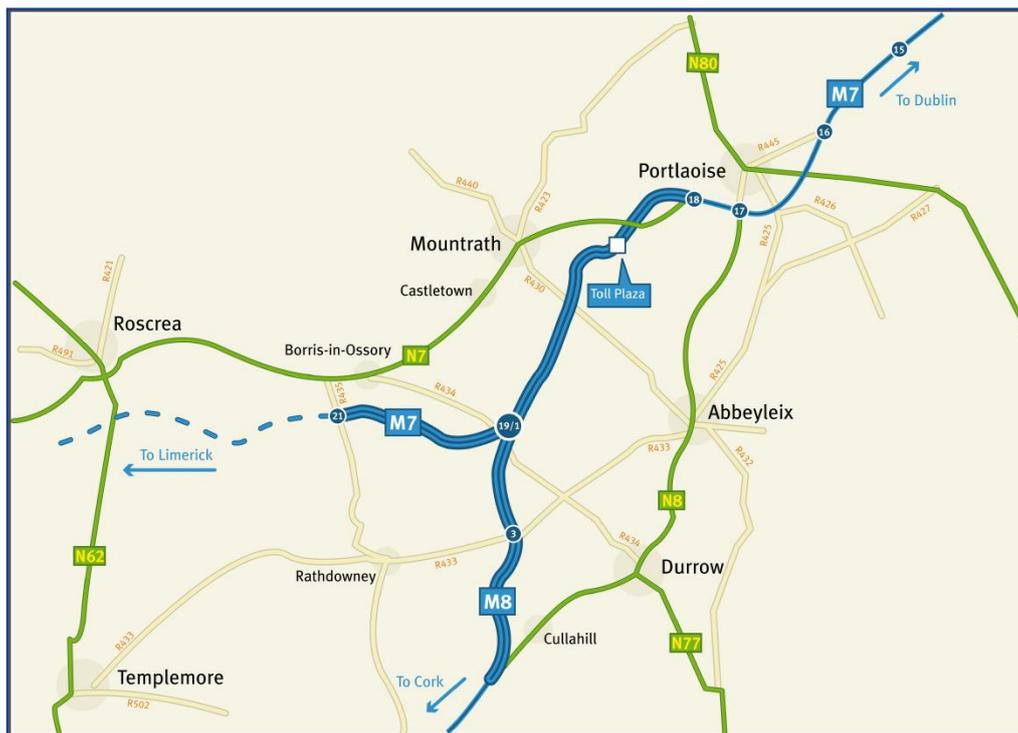
1 Introduction

1.1 The Scheme

The M7/M8 Portlaoise to Cullahill/Castletown PPP Scheme involved the provision of 40 km of standard two-lane motorway, approximately 3 km of single carriageway link roads, approximately 15 km of side roads, three grade separated junctions and a motorway to motorway interchange forming part of the N7 Dublin to Limerick route and the N7/N8 Dublin to Cork route.

The Scheme covers the proposed routes of the M7 and M8 from the Portlaoise By-pass to beyond Borris in Ossory on the existing N7, and beyond Cullahill on the existing N8.

Figure 1.1 Map of M7/M8 Portlaoise to Cullahill/Castletown Scheme



Procured as a Public Private Partnership (PPP) project, the Contract was awarded to the Celtic Roads Group (Portlaoise) Limited (CRG) consortium in June 2007, and will extend for 30 years from that date. In May 2010 the Scheme was opened. Built as part of a Concession PPP Scheme, users of the motorway are tolled in accordance with the Toll Byelaws developed for the Scheme.

This report comprises a Post Project Review of the M7/M8 Portlaoise to Cullahill/Castletown PPP Scheme.

1.2 Guidelines for Post-Project Review

Post Project Reviews are typically carried out a few years after the opening of a scheme. This allows the reviewer to make an initial assessment of the performance of the scheme.

The current standards for Post Project Reviews (PPR) of capital infrastructure projects are those set out in the 'Public Spending Code' first published by the Department of Public Expenditure and Reform (DPER) in 2011. This Code specifies that the aim of such a PPR is to determine whether:

- The basis on which a project was undertaken proved correct;
- The expected benefits and outcomes materialised;
- The planned outcomes were the appropriate responses to actual public needs;

- The appraisal and management procedures adopted were satisfactory; and
- Whether conclusions can be drawn which are applicable to other projects, to the ongoing use of assets, or to associated policies.

Since the early 2000s successive guidance documents have been published by various Government departments which set out the recommended steps that should be undertaken when implementing PPP projects in Ireland to ensure better Value for Money for the Exchequer.

The available guidance at the time includes a policy framework by the Department of Environment Heritage and Local Government² and updated guidelines published by the Department of Finance³. The Department of Finance guidelines were published in 2006 at which point planning for the M7/M8 Portlaoise to Cullahill/Castletown PPP Scheme was well advanced. An overview of PPP guidance is provided in Appendix A.

The PPP guidance that was in place at the time the M7/M8 Portlaoise to Cullahill/Castletown PPP Scheme was being planned was not as comprehensive as the most recent guidelines.

The available guidance allowed the identification of some of the key areas that should be covered when completing Post Project Reviews of PPP Schemes, including

- Reviewing the PPP planning steps;
- Reviewing the PPP procurement decision; and
- Reviewing the PPP scheme implementation.

Similarly the NRA's project appraisal guidance has evolved through the years with the NRA's Project Appraisal Guidelines (first published in 2008⁴) determining the current recommended process to be followed.

On the basis of the overview of the guidance above, a two part approach to this Post Project Review was adopted. In the first instance, a value for money review of the scheme itself was undertaken, identifying the established project need, whether the project design process was properly planned, and whether the project is delivering benefits in excess of costs.

The second part of this Post Project Review (PPR) comprises a value for money review of the decision to procure the scheme as a PPP. This includes a review of the PPP pre-planning steps undertaken, a review of the PPP procurement decision, and a review of the PPP scheme implementation to date in terms of expected outcomes.

1.3 Layout of the Report

The broad structure of PPR is as follows: Section 2 outlines a traditional Post Project Review of the M7/M8 Portlaoise to Cullahill/Castletown as a scheme. This is in line with the NRA *Project Appraisal Guidelines* (PAG), the DPER *Public Spending Code* and the Department of Transport's '*Guidelines on a Common Appraisal Framework for Transport Projects and Programmes*', 2009.

Sections 3-5 focus on a review of the procurement of the scheme as a Public Private Partnership (PPP). Section 3 reviews the pre planning steps carried out by the NRA prior to procuring the scheme as a PPP. Section 4 reviews the basis of the decision to procure the scheme as a PPP, while Section 5 is concerned with the PPP project outturn relative to the outturn anticipated. Finally Section 6 presents a summary of the PPR findings and recommendations.

² Policy Framework for Public Private Partnership (PPP) in Ireland – Department of the Environment Heritage and Local Government, November 2003. Note: Appendix 1 of the framework document provides a detail of the key documents in the PPP area prior to 2003

³ Guidelines for the Provision of Infrastructure and Capital Investments through Public Private Partnerships: Procedures for the Assessment, Approval, Audit and Procurement of Projects – Department of Finance, July 2006

⁴ The Project Appraisal Guidelines were first published in 2008 and have developed incrementally from that point

2 Scheme Review

2.1 Introduction

As outlined in Section 1, the *'Public Spending Code'* identifies a number of questions that need to be answered as part of a Post Project Review of a scheme. The approach taken here to address the requirements of the Code is to identify key stages in the scheme development and the key questions regarding each stage that address the requirements set out in the Code, as follows⁵:

- Scheme Conception
- Scheme Planning
- Scheme Implementation
- Scheme Operational Performance

2.2 Scheme Conception

2.2.1 Background

The M7/M8 Portlaoise to Cullahill/Castletown PPP Scheme was procured as a Public Private Partnership incorporating the design and construction of 40 km of new standard two-lane motorway and ancillary roads.

The M7/M8 Portlaoise to Cullahill/Castletown PPP Scheme is an important element of the national road network, forming part of the N7 Dublin to Limerick route and the N7/N8 Dublin to Cork route. Given its location, on a junction of 2 major national routes, it is of key strategic importance in the completion of the overall network.

The existing N7 between Portlaoise and Castletown (20km) and the N8 between Portlaoise and Cullahill (27km) were single carriageway routes that passed through a number of towns and villages including Mountrath and Castletown on the N7 and Abbeyleix and Durrow on the N8. There were bottlenecks forming in these locations at peak travel periods.

The scheme was developed as a PPP scheme on the basis that a PPP could deliver

- (i) value for money when compared to traditional procurement;
- (ii) facilitate the injection of private finance and accelerate the delivery of the national road improvement schemes to reduce Ireland's infrastructural deficit; and
- (iii) ensure a high quality route that would offer a greatly improved service for users of the then existing N7/N8, that would be capable of accommodating significant traffic volumes.

The Contract to construct the scheme was awarded in June 2007 and the scheme opened in May 2010.

2.2.2 Need and Objectives

The need for improved N7 and N8 routes between Portlaoise and Castletown / Cullahill was identified in a number of national policy documents, namely:

- The National Road Needs Study 1998
- The National Development Plan 2000 – 2006
- Laois County Development Plan 2000 (amended 2001)

The National Road Needs Study 1998 assessed the existing level of service provided by the National Primary and Secondary road system in the country, and determined the appropriate and affordable

⁵ A more detailed summary of the relevant stages and key questions are set out in Appendix A.

type of road for each section on the network in order to cater for traffic flows projected over a 20 year period (2000 – 2019).

It was identified that the N7 passed through the town centres of Mountrath and Borris in Ossory and the N8 passed through the towns of Abbeyleix, Durrow and Cullahill which was creating significant bottlenecks with queuing evident at peak times. The Study indicated that the N7 between Mountrath and Portlaoise was sub-standard for the level of traffic it was catering for. The section of route between Abbeyleix and Portlaoise on the N8 was also identified sub-standard relative to the level of traffic it was carrying.

The National Development Plan 2000 – 2006 identified the N7 and the N8 National Primary Routes as routes to be developed to motorway/high quality dual carriageway standard by 2006.

The Laois County Development Plan 2000 (amended 2001) included objectives relating to inter alia: the Mountrath Bypass; the Abbeyleix Bypass; the Durrow Bypass and the N7 N8 improvement south of Portlaoise and at Tonduff/Corbally, Durrow, Cullahill and Clonenagh/Portlaoise.

It was identified as the policy of the Council to facilitate the development of the National Primary Road Network in accordance with the National Development Plan 2000 – 2006, namely:

- To facilitate and develop in association with other agencies the provision of a primary transportation network which does not require passage through towns and villages
- To provide in association with other agencies, both statutory and commercial, an integrated efficient transportation network commensurate with the economic development of the County

2.3 Scheme Planning

2.3.1 Current NRA Project Management and Appraisal Guidance

The present day guidelines were not in place at the time the M7/M8 Portlaoise to Cullahill/Castletown scheme was being developed. Indeed, the experience of this and other similar schemes is likely to have been an input to the development of the current guidelines. Nonetheless it is useful to examine the present day guidance.

As part of the NRA's current Project Management Guidelines (2010) and Project Appraisal Guidelines (2008 onwards) there are a number of recommended steps involved in the planning of a new road development. These are summarised in Table 2.1.

Table 2.1 Summary of Key Deliverables as per Current Guidance

Phase	Project Management Guidelines Deliverables	Project Appraisal Guidelines Deliverables
2 – Route Selection	Public Consultations Route Selection Report Variation to County Development Plan Public display (preferred route)	Traffic Modelling Report Cost Benefit Analysis Updated Project Brief Preliminary Business Case Project Appraisal Balance Sheet
3 - Design	Design Report	Revised Traffic Modelling Report CBA (using Target Cost and Total Scheme Budget)
4 – Statutory Processes	EIS/CPO documents	Revised Traffic Modelling Report CBA (using Target Cost and Total Scheme Budget) Updated Project Brief Revised Project Appraisal Balance Sheet Business Case
5 – Tender & award	Tender Documents Tender Report	Updated Traffic Modelling Report Updated Cost Benefit Analysis Updated Project Brief Updated Project Appraisal Balance Sheet Final Business Case

Source: NRA Project Management Guidelines 2010

2.3.2 Guidance in Place at Scheme Preliminary Design Stage

Both the 2010 Project Management Guidelines and the 2008 Project Appraisal Guidance were put in place by the NRA post the awarding of the contract for this scheme. Some elements of the scheme also pre-dated the NRA's 2000 Project Management Guidelines and the DOT 2004 published '*Parameter Values for Use in Cost-Benefit Analysis of Transport Projects*'.

The main source of appraisal guidance in place at the time of the implementation of the scheme was the UK Design Manual for Roads and Bridges (DMRB) and the UK Treasury Taskforce policy statements and technical notes⁶. In addition, the National Roads Needs Study (1998), included forecast traffic growth on the national road network in Ireland over the period to 2019.

2.3.3 Traffic Analysis and Forecasting

Arup was appointed to complete a study of proposed improvements to the N7 between Portlaoise and Castletown and the N8 between Portlaoise and Cullahill. Arup prepared a computerised traffic simulation model representing existing conditions on the road network, and modelling the effects of the M7/M8 Scheme proposal, using SATURN traffic modelling suite.

Separate traffic models were constructed by Arup to provide peak hour forecasts for morning and evening peak periods, as well as a representative day-time period (inter-peak), for a typical week day. The traffic model took into account the tolling of the proposed motorway, where the monetary costs of the tolls were expressed as time equivalent penalties on the relevant section of the newly proposed motorway.

The traffic model was based on 2001 traffic data sourced via:

- Automatic traffic count data;
- Manual classified counts;
- Two way road side interview (RSI) surveys of the origin and destination and purpose of trips; and

⁶ UK Treasury Taskforce "Policy Statement No. 2 – Public Sector Comparators and Value for Money" and "Technical Note No. 5 – How to Prepare a Public Sector Comparator"

- Journey time surveys.

Three years were modelled as follows: the Scheme Opening Year was 2008, the design year was 2018, and the long term assessment year was 2028. Future year traffic forecasts were prepared for the opening, design and long term assessment years. The forecasts were completed for a Do Minimum, Do Something with No Toll and a Do Something with Toll scenario.

The three year (2008, 2018, 2028) forecasts, for each of these scenarios were completed for:

- A scenario where only the M7/M8 Portlaoise to Cullahill/Castletown Scheme was developed
- A scenario where the M7/M8 motorway scheme was complemented by all proposed N7-N8 road improvement schemes west of Portlaoise.

Forecast trip matrices were developed by factoring the base 2001 matrices with growth factors produced as part of the National Roads Needs Study.

Table 2.2 Forecast Traffic Growth Rates

Period	Car	HGV
2001-2010	3.75%	2.76%
2011-2020	1.40%	1.13%
2021-2028	0.46%	0.41%

Source: Table 6.1 N7 Portlaoise-Castletown N8 Portlaoise to Cullahill Toll/PPP Study (Arup Transport Planning, July 2003)

The initial study was carried out in July 2003 with further addendum reports issued in October 2003, February 2005 and August 2006. The addendums reflect the removal of junctions from the scheme⁷.

The traffic figures provided in Table 2.3 below show the traffic forecasts from the final Traffic Report (August 2006) for the Do-Something with Toll Scenario where all of the proposed N7-N8 road improvement schemes west of Portlaoise are also built. This reflects the scheme that was subsequently built.

Table 2.3 Forecast Daily Traffic Flows on M7/M8 Portlaoise to Cullahill/Castletown Scheme (Tolled)

Location	AADT		
	2008	2018	2028
M7 between Portlaoise and M7/M8 Interchange	17,300	22,200	24,600
M7 between Borris in Ossory and the M7/M8 Interchange	8,800	11,400	12,800
M8 between Rathdowney and the M7/M8 Interchange	8,500	10,800	11,900
M8 between Rathdowney Junction and Cullahill	8,000	10,100	11,000

Source: Updated Traffic Data for Oral Hearing (Arup, August 2006) – assumes all schemes west of Portlaoise proceed

The traffic analysis was based on central traffic forecasts with no high and low growth traffic growth scenarios modelled.

2.3.4 Route Selection and Preliminary Design

In 2001 a Corridor Selection Study was completed. The Corridor Option Selection Study identified five corridor options based on the outcome of a Constraints Study which was completed in 2000. The chosen corridor was selected on the basis that: it represented the least impact to the River

⁷ The October 2003 addendum removed the R434 and Cullahill junctions on the M8. The February 2005 addendum removed the R434 junction on the M7 in addition to those removed in the previous addendum. The August 2006 update was provided for the Oral hearing.

Barrow/River Nore; it required circa 10 km less major road construction than other options; and it avoided direct impacts on the estate lands at Abbeyleix and Durrow.

Having identified the most suitable route corridor, three route alternatives within the corridor were considered as part of a Route Selection Study in 2002. The Route Selection process comprised a technical evaluation of each proposed route option taking into account engineering, economic and environmental impacts under a number of headings including: land use and planning; landscape and visual; traffic engineering and cost; socio-economic; geology, as well as agriculture. The options analysed tied in with the M7 Portlaoise Bypass, as well as the route options developed for the Cullahill to Cashel Scheme to the South and the route options developed for the N7 Castletown to Nenagh Scheme to the west. The preferred route option was subject to an environmental impact assessment.

Three alternatives were considered for the location of the Toll Plaza. The preferred location was chosen on the basis of the least impact on residences.

A project appraisal was not carried out at route choice stage.

2.3.5 Project Appraisal

An economic evaluation of the Scheme was undertaken in May 2004 using COBA11. The National Roads Authority Guidelines for Cost Benefit Analysis were used in adapting the COBA application for use on the Irish road system.

A discount rate of 5% and a 30 year evaluation period from year of opening was examined. 2002 was the present value year used.

The output of the traffic model (discussed above) was used as an input to the economic evaluation. This included the forecast Annual Average Daily Traffic (AADT) for each section of road between junctions. It should be noted, that the high traffic growth rates from the NRA Guidelines were used in the economic evaluation. Therefore the traffic levels in future years used in the economic appraisal were higher than predicted in the Traffic Report. The impact of reduced traffic volumes due to the imposition of a toll was not examined.

The estimated cost of the Scheme at 2002 prices was €439m, excluding VAT (including the costs associated with construction, land, property and design). The costs of the scheme were compared to the forecast benefits which included time savings, vehicle operating costs and accident savings. The results of the economic evaluation identified a Net Present Value of €217m.

The results of the evaluation are shown in Table 2.4. The Internal Rate of Return (IRR) of 7.32% and the Benefit to Cost Ratio (BCR) of 1.49 were positive but not as high as those seen in other similar schemes.

Table 2.4 Results of Economic Evaluation (2002 Prices)

Period	
Present Value of Benefits €m	655.8
Present Value of Costs €m	438.9
Net Present Value €m	216.9
IRR %	7.32
Benefit to Cost Ratio (BCR)	1.49

Source: N7 Portlaoise to Castletown – N8 Portlaoise to Cullahill Economic Assessment Report (Arup, May 2004)

It should be noted that the benefits are heavily dependent on the volume of traffic using the scheme over its lifetime whereas the costs are less subject to change.

There was no sensitivity analysis completed to varying traffic growth and scheme cost outcomes. This is surprising given the use of non-tolled traffic volumes and high traffic growth forecasts.

The economic appraisal of the Scheme was not re-visited at tendering stage, when revised costs estimates and up to date traffic forecasts associated with the Scheme were available.

2.3.6 Compliance with Procurement, EIS and other Statutory Requirements

An Environmental Impact Statement (EIS) was prepared for the M7/M8 Portlaoise to Cullahill/Castletown Scheme in December 2003.

Procurement of the M7/M8 Portlaoise to Cullahill/Castletown Scheme was via a Public Private Partnership (PPP) arrangement advertised in the OJEU in September 2005. The preferred tender was selected in March 2007 and the contract signed in June 2007.

All of the above processes satisfied the statutory procedures in place at the time.

2.3.7 Adequacy of Consultation Processes

The public were invited to take part in a number of consultation sessions during the Constraints Study, Corridor and Route Selection Stages. The consultations were advertised in the local and national press, on radio, and by flyer advertisements. A public display was held when the Preferred Route was selected. The consultation sessions were attended by Laois County Council and Arup.

Following the selection of the Preferred Route, individual consultations took place with landowners directly impacted by the Scheme. The design of the Scheme was influenced by concerns raised by affected landowners. The consultation with affected landowners identified areas where minor modifications to the route which resulted in reductions in the impact of the Scheme. In a number of instances the preferred route was moved to mitigate impacts.

The public were invited to make written submissions in relation to the contents of the EIS.

2.4 Scheme Implementation

2.4.1 Scheme Management Structures

The preliminary design of the Scheme was carried out in accordance with the Design Manual for Roads and Bridges applicable at that time.

2.4.2 Scheme Schedule, Management and Costs

The M7/M8 Portlaoise to Cullahill/Castletown Scheme was procured as a PPP. The Scheme implementation in terms of the delivery of the Scheme to the specification as set out in the PPP Contract, the management of the PPP Contract, the budget schedule, and the budget outturn are explored in detail in Section 5, where the performance of the Scheme is reviewed in terms of anticipated outcomes.

2.5 Scheme Operational Performance

2.5.1 Traffic Outcomes on the New Road

The objectives of the scheme were to relieve congestion at traffic congestion towns along the corridor, facilitate shorter travel times with associated cost savings, improve accessibility, and contribute to a reduction of fatal accidents along the route.

The achievement of such objectives largely depends on the success of the scheme in attracting traffic to the M7/M8. In this context, the key question is whether the scheme has achieved the predicted level of traffic volumes.

The Traffic Report⁸ contains traffic predictions for 2008, 2018 and 2028 for the scheme. Interpolating between these dates yields the equivalent traffic predictions as set out in Table 2.5.

Table 2.5 Comparison of Forecast and Actual Traffic Volumes (AADT), 2007-2012

	M7 between Portlaoise and M7/M8 Interchange		M7 between Borris in Ossory and M7/M8 Interchange		M8 between Rathdowney and M7/M8 Interchange	
	Forecast	Actual	Forecast	Actual	Forecast	Actual
2008	17,300	-	8,800	-	8,500	-
2009	17,740	-	9,030	-	8,710	-
2010	18,190	16,994	9,270	6,646	8,920	9,103
2011	18,650	18,877	9,510	9,249	9,140	9,624
2012	19,120	18,789	9,760	9,215	9,360	9,671
2013	19,600	19,279	10,020	-	9,590	-

Source: Traffic Reports (Arup) and NRA Traffic Counter Data

As the Table outlines, since the Motorway road opening in 2010 the level of usage of the new motorway has been only marginally below the levels forecast as part of Traffic Report.

The Economic Assessment (discussed above in Section 2.3.5) is based on forecast traffic volumes with no toll and uses higher growth level assumptions than the Traffic Report. A comparison is carried out of the traffic forecasts used in both the Economic Assessment and Traffic Report with the actual traffic volumes at the toll location. The results are shown in Table 2.6.

Table 2.6 Comparison of Forecast and Actual Traffic Volumes (AADT) at M7/M8 Toll, 2007-2012

	Economic Assessment Forecast*	Traffic Report Forecast	Actual
2008	19,400	17,300	-
2009	19,960	17,740	-
2010	20,540	18,190	16,994
2011	21,130	18,650	18,877
2012	21,740	19,120	18,789
2013	22,160	19,600	19,279

Source: Economic Assessment (Arup), Traffic Reports (Arup) and NRA Traffic Counter Data

* Economic Assessment Forecast based on forward projection of level and growth rates used in assessment

These results show that although the actual traffic volumes are within 2% of the levels forecast in the Traffic Report, they are almost 13% below the levels used in the Economic Assessment. This is primarily due to the use of non-toll traffic volumes and high traffic growth rates in the Economic Assessment.

An examination was also carried out between the projected traffic levels in 2028 between the Traffic Report and Economic Assessment which found a similar level of difference (13-14%). This implies that the difference in traffic volumes between the Traffic Report forecasts and Economic Assessment will remain steady in percentage terms.

⁸ The traffic report was originally published in July 2003 with further updates in October 2003, February 2005 and August 2006. The most recent data is used unless otherwise stated.

2.5.2 Road Safety Outcomes

One of the objectives associated with the scheme was a reduction in the level of fatal accidents along the route. Research has indicated that, historically, motorways have proved to be seven times safer than two lane roads in general and three times safer than dual carriageways⁹.

In the period since the M7/M8 Portlaoise to Cullahill/Castletown opened in 2010 to the end of 2012, there were no serious or fatal collisions on the scheme. There has also been a notable reduction in serious and fatal collisions on the old route, primarily due to a reduction in traffic. Although more recent data is not yet available, the reduction in both serious and fatal collisions along the corridor is very positive.

Table 2.7 Number of Serious and Fatal Collisions on New and Old Routes

	New M7/M8		Old N7/N8	
	Serious	Fatal	Serious	Fatal
2005	-	-	3	10
2006	-	-	3	5
2007	-	-	3	1
2008	-	-	2	4
2009	-	-	0	3
2010	0	0	2	1
2011	0	0	0	1
2012	0	0	2	0

Source: Road Safety Authority Collision Statistics

2.5.3 Overall Economic Return to the State

The M7/M8 Portlaoise to Cullahill/Castletown PPP Scheme is likely to deliver overall value for money for the State based on the following:

- The current traffic volumes using the scheme are largely in keeping with the level predicted in the final Traffic Report;
- The Economic Assessment assumes a higher growth rate than the Traffic Report. Therefore the current traffic volumes using the scheme are lower than used in the Economic Assessment;
- Although the traffic volumes on the scheme are 13% lower than those used in the Economic Assessment, the expected benefits would need to decrease by over 33% before the scheme would not provide a positive economic return;
- Non-users of the scheme have benefited significantly from reduced congestion, particularly in towns along the old route;
- The traffic volumes using the scheme and the low fatal collision rate suggests that the safety benefits associated with motorways are being achieved.

⁹ See: D O'Connell et al. Inter-urban Accident Rates by Road Type and Geometric Elements. Association of European Transport, 2004.

2.6 Summary

Since the opening of the M7/M8 Portlaoise to Cullahill/Castletown Scheme, large volumes of traffic have used the motorway, and it has contributed to a significant reduction in the volumes of traffic in the towns and villages along the old N7/N8 corridors and a reduction in overall traffic congestion.

Although the actual traffic volumes to date are below the values used in the economic assessment (13% below in 2013), the scheme is still expected to have a positive net economic benefit over its lifetime.

To date, the safety record of the bypass indicates that it is delivering the safety benefits associated with motorways in general.

The scheme was successfully planned and implemented. The preliminary design of the scheme was carried out in accordance with the Design Manual for Roads and Bridges applicable at that time.

However, the Economic Assessment did not evaluate the impact of reduced volumes of traffic due to tolls, used a high traffic growth assumption and was not revisited when traffic estimates were updated.

In addition, the economic analysis was not updated prior to contract award, when revised cost estimates and traffic forecasts associated with a PPP procurement of the Scheme were available. A revised CBA at the tendering stage now forms part of the NRA's Project Appraisal Guidelines, which addresses this shortcoming for all current/future schemes.

3 PPP Pre-Planning Review

3.1 Introduction

This section reviews the pre-planning steps completed by the NRA in progressing the M7/M8 Portlaoise to Cullahill/Castletown Scheme as a PPP.

3.2 Background

A PPP is a partnership between the public and the private sector for the purpose of delivering a project. There is a sharing of project risks between the public and private sectors. A PPP project benefits from an accelerated implementation through the availability of private sector funding. This is particularly the case in situations of limited public finances, where access to private sources of funding allows the progression of projects that would not otherwise be possible.

A number of guidance documents have been published by the authorities with responsibility for implementing PPPs, since the first PPPs were procured in Ireland over ten years ago. A summary of some of the key PPP guidance documents is provided in Appendix A. There are a number of planning steps recommended when considering a Scheme as a potential PPP.

3.3 PPP Scheme Selection

The *National Development Plan (NDP), 2000 - 2006* included an objective for the concentration of investment on the five strategic national roads linking the main urban areas in the country. The NDP confirmed the policy for PPPs on being the maximum usage of PPP consistent with the principles of efficiency and best value for money. Minimum targets for PPP private funding were included in the NDP, including 23% of the total €5.97 billion 2000 – 2006 road investment programme.

In mid-1999 the Government requested that the NRA examine a number of schemes to assess their potential as PPP schemes. The M7/M8 Portlaoise to Cullahill/Castletown Scheme was announced as part of the NRA's Tranche II PPP roads programme in June 2000.

The NRA established certain key principles to guide its PPP road scheme selection analysis. These principles were as follows:

- The use of the PPP mechanism would not delay scheme delivery;
- An alternative toll-free route should be available for road users;
- Tolloed roads should be spread across the main national routes to create an equitable distribution of user-charging on the country's newly constructed road network;
- A road project needed to be a minimum of £30 million (€38m) in value in order to produce value for money when using the PPP process; and
- A public subsidy would be considered for high cost schemes which could not be solely financed from tolls.

When examined in terms of these principles, the NRA determined that the M7/M8 Portlaoise to Cullahill/Castletown met the criteria as a potential PPP Scheme.

3.4 Assessment of Shadow Bid Model

Prior to the commencement of the PPP tender process a Shadow Bid Model (SBM) was developed by the financial advisors (KPMG). The SBM included the following input information:

- Projected traffic and toll level information provided by the NRA's traffic advisors;
- Scheme costs provided by NRA and/or its technical advisers (Jacobs Baktie); and
- Financing assumptions in relation to debt, equity and economic assumptions.

The SBM was used to run a variety of financial scenarios which illustrated (or 'shadowed') how a private sector bidder might approach the scheme. The Shadow Bid Model is used to inform decisions in relation to the structuring of the transaction to be provided for in the tender requirement. An

overview of certain financial related tendering requirements as provided for in the M7/M8 Portlaoise to Cullahill/Castletown tender invitation documents are set out in the table below.

Table 3.1 Tender Requirements

Key Features of M7/M8 Portlaoise Motorway PPP Scheme Tender Requirements

- Construction and operational payments are available up to set limits
- Tenderers will be entitled to collect tolls for up to 30 years and are required to share a proportion of the toll revenue with the NRA based on traffic volumes. The option was available for tenderers to bid Variant Tenders with a 35 year concession period.
- The Tenderer will be subject to non-availability payments which will be payable by the Tenderer to the NRA
- The Base Toll Charges (2004 prices) will be increased in line with inflation (CPI) and are the maximum tolls that can be levied
- The Tenderer will not be permitted to generate excessive returns from the project and therefore bids must include an increasing revenue share for the NRA as vehicle numbers increase.

3.5 Value for Money (VFM) Assessment

The PPP planning guidance states that the decision to procure a project as a PPP should be based on a VFM assessment. This assessment compared the costs of procuring the scheme by traditional means (the Financial Comparator) with the equivalent costs of procuring the scheme by means of a PPP.

VFM comparisons were undertaken at various stages in order to ensure the continuing rationale for procuring the Scheme through a PPP option. These stages are as follows:

- Following receipt of Invitation to Tender (ITN) responses;
- Following the receipt of Best and Final Offers (BAFO); and
- Shortly before financial close (to reflect any material changes in the BAFO or Provisional Preferred Tenderer)

Under the 2006 Department of Finance guidelines, formal VFM tests are now required to be carried out to determine whether, and in what form, a PPP arrangement has the potential to offer the best value for money. A further VFM test is required at completion of the Public Sector Benchmark. These guidelines were not in place at the time the procurement process was underway.

A financial comparator was prepared as part of the Value for Money Assessment of the M7/M8 Portlaoise to Cullahill/Castletown Scheme, which identified the costs of procuring the scheme using a traditional procurement approach.

It should be noted that tenderers were required to make their own traffic forecasts. In most cases, these were significantly higher than the NRA's estimate. In carrying out the Value for Money assessments, the NRA's traffic estimates were used to forecast revenue share payments. Using the NRA's traffic forecasts ensured a sound basis for the VFM and allowed all tenders to be compared on an equal footing.

3.6 Preparation of the Financial Comparator

The Financial Comparator (FC) consists of an assessment of the total costs that would be incurred in the provision of a scheme through a traditional procurement scenario in which the public sector retains managerial responsibility and exposure to risk. In preparing the FC for the M7/M8 Portlaoise to Cullahill/Castletown, DOEHLG and UK Treasury guidance was used, as was the experience in

preparing previous Financial Comparators by the NRA's specialist advisors i.e. technical (Jacobs Bابتie) and financial (KPMG).

As per the Guidance, the costs included in the FC were as follows:

- Base costs: the public sector's estimate of the costs it would incur to construct, maintain and manage the infrastructure for the duration and to the specification of the contract, before allowing for contingencies or risks.
- Retained risks: these risks, by their nature, always rest with the public sector;
- Risk retained under traditional procurement, but transferred under PPP: an allowance for the additional costs to the public sector as a consequence of the risks associated with the project.
- Efficiency adjustments: allows for the public sector improving its performance in managing base costs and the impact of risks over the life of the project.

As per the guidance, the FC was prepared prior to the receipt of ITN Tenders, to ensure it represented the NRA's best estimate of the cost of delivering the services required under the PPP scheme without being influenced by knowledge of the private sector's actual proposals¹⁰.

3.7 Risk Assessment

In line with the Guidance, in preparing the FC, the risks capable of being quantified, that differed between the public and private sectors were assessed.

The approach to valuing of risk was based on a database of risk knowledge gained as part of the closing of three PPP deals, the preparation of five financial comparators for previous PPP Schemes, as well as information emerging from NRA Schemes procured using Design and Build methods. The approach used was to assign a generic range of probabilities to each major risk category (Capital, Operational, Demand etc), on the basis of risk estimates from previous schemes. The probabilities were applied to the total cost estimates of each category to quantify the level of risk for the category as a whole.

Risks not amenable to quantification, but with the potential to influence the VFM assessment, were identified separately as part of the VFM assessment.

3.8 PPP Procurement Steps

Public Private Partnerships are a form of procurement and as such are subject to all the normal discipline applying to procurement generally, including Department of Finance procurement guidelines as well as EU Procurement Directives.

The procurement of the PPP Scheme was conducted in an open and transparent manner, and in line with the relevant EU and national regulations.

3.9 Summary

The planning steps implemented by the NRA prior to procuring the M7/M8 Portlaoise to Cullahill/Castletown Scheme as a PPP were reviewed in line with the official PPP implementation guidance. The relevant steps advocated in the guidance documents were implemented by the NRA.

As set out in Section 2, the steps above would have been enhanced by the completion of a revised economic appraisal at the tendering stage. This would ensure explicit consideration would be given to updated cost/traffic projections relating to the scheme. As noted in Section 2, a revised CBA at the tendering stage now forms part of the NRA's Project Appraisal Guidelines, which addresses this shortcoming for all current/future schemes.

¹⁰ Two Financial Comparator scenarios were modelled, one with public sector tolling and one without tolling

4 PPP Procurement Review

4.1 Introduction

This section includes a review of the VFM assessment undertaken to determine if the basis on which the decision was taken to procure the scheme as a PPP was appropriate.

4.2 Outcome of VFM Assessment

The VFM Assessment compared, over the lifetime of the scheme, the Net Present Value (NPV) of the Exchequer cash flows associated with the traditional procurement scenario, with the NPV of the Exchequer cash flows associated with the PPP procurement scenario.

Table 4.1 sets out, in summary format, the NPV of the NRA and Exchequer costs and revenues associated with both procurement options *at BAFO* (as per the successful concessionaire).

Table 4.1 Summary of Exchequer Costs of the scheme at BAFO

Financial Comparator (Traditional Procurement – with tolling)	NPV 000 €	PPP Option Preferred Tenderer	NPV 000 €
Base Costs (ex VAT)	400.0	Construction payments	24.7
Toll Costs (ex VAT)	112.1	Operational payments	29.1
Toll Revenue	(274.8)	Average Revenue Share (factored by 80%)	(5.3)
VAT on Costs	78.6		
Total Non-Risk adjusted cost to the NRA	315.9	Offer Price	48.5
Total Non-Risk adjusted cost to the NRA (ex VAT)	237.3		
Risks Retained Costs (ex VAT)	103.7	Retained Risks in either FC or PPP	5.5
Risks Retained Revenue (20% factor)	55.0		
Risks Retained Revenue (other)	5.5		
VAT on Costs Risks	15.0		
Total Risk Adjusted Cost to the NRA	495.1	Total Risk Adjusted Cost to the NRA	54.0
Less incremental cash flows to Public Sector	(93.6)	Less incremental cash flows to Public Sector [^]	(17.1)
Total Risk Adjusted Cost to the Public Sector	401.5	Total Risk Adjusted Cost to the Public Sector	36.9

Source: Value for Money Assessment, M7/M8 Portlaoise PPP Scheme, June 2007

[^]Rates (€17.1m), Tax (€0m)

As set out in the table above, there were estimated net costs associated with the PPP option, totalling €36.9 million, compared to an estimated cost of traditional procurement totalling €401.5 million, a difference of €365 million.

This difference of €365 million is significant and is heavily impacted by the traffic forecasts used by the preferred tenderer. The higher level of traffic forecasted by the preferred tenderer led to a higher estimate of income that would be generated from the scheme and therefore a much lower subvention cost to the public sector. In the VFM assessment above, the NRA traffic forecasts are used for the Financial Comparator and in forecasting the revenue share due to the NRA under the PPP. Therefore all of the financial flows to and from the public sector reflect the NRA traffic forecasts.

The higher estimated public sector costs associated with traditional procurement and assuming public sector tolling as provided in the Financial Comparator option relative to the PPP procurement option resulted in the decision being taken to procure the Scheme as a PPP.

NRA Traffic forecasts were used as part of the VFM assessment to determine the toll revenue attributable to the NRA from the Scheme in the case of the Financial Comparator. The revenue was factored by 80%¹¹ giving a net forecast of €220 million.

Since the opening of the M7/M8 Portlaoise to Cullahill/Castletown the traffic levels using the M7/M8 Motorway have been generally in keeping with the levels forecast by the NRA (within circa 2%). Therefore, it could be argued that the realised toll revenue is likely to be much closer to the €275 million estimate in the VFM assessment (prior to the application of the 80% weighting). The revenue share associated with the PPP option would similarly increase from €5.3 million (80% weighting) to €6.6 million (100% weighting).

In addition the non application of the 80% revenue weighting (as per the DoF guidelines) would see the €365 million difference in total risk adjusted cost to the public sector between the PPP option and the Financial Comparator narrow to approximately €308 million. This assumes there is no risk associated with traffic volumes falling below forecast levels in the future. Nonetheless, the cost reduction to the public sector in opting for a PPP over a traditional contract type remains substantial.

4.3 Review of Components of Financial Comparator

A detailed review was undertaken to determine if the individual cost and revenue items included in the Financial Comparator and PPP options represent accurate approximations of the costs and revenues attributable to the Exchequer under each procurement option. Full details of this review are included in Appendix B which can be summarised as follows:

- The total costs used in the Financial Comparator exceed the average total cost from the five tenders by 27% at ITN stage;
- The primary difference was seen in the capital construction costs which were 40% higher than the average of tenders;
- The risk values associated with the FC scenario revealed that the cost risk values of €119 million (20% of total costs) are broadly acceptable; and
- Traffic volumes are largely in keeping with forecasts used to estimate Toll Revenue. However, an 80% factor was applied to Toll Revenue, as provided for in DoF guidelines, to account for the risk associated with uncertain incomes. Toll Revenue is likely to be much closer to the €275 million estimate (before the 80% factor is applied) than the €220 million estimated used in the Financial Comparator.

¹¹ With reference to Department of Finance guidelines regarding uncertain cash flows

4.4 Summary

The NRA's decision to procure the M7/M8 Portlaoise to Cullahill/Castletown as a PPP was based on a VFM Assessment. The results of the VFM assessment showed there were higher NRA costs to the order of €365 million associated with the Financial Comparator relative to the PPP option, which resulted in the decision being taken to procure the Scheme as a PPP.

Following a detailed review of the components of the VFM assessment, it was determined that the net cost of the Financial Comparator was potentially overestimated by the order of 27% compared to the average tenders received.

The traffic volumes seen on the scheme to date are largely in keeping with traffic forecasts and therefore the 80% factor applied to Toll Revenue is likely to have been overly conservative.

Nonetheless, the cost to the Public Sector remains substantially lower for the PPP option. Therefore the decision to procure the scheme as a PPP represented value for money for the Exchequer and was the appropriate decision for the scheme.

5 PPP Scheme Implementation Review

5.1 Introduction

This section reviews the implementation of the M7/M8 Portlaoise to Cullahill/Castletown Scheme to date. The scheme's implementation is reviewed across three key criteria, as follows:

- **Timing:** A review of the time taken to complete the various stages of the scheme
- **Quality:** An analysis of whether the key elements of the scheme as per the project specification were achieved; and
- **Costs and Revenues/Traffic Volumes:** an analysis of the public sector costs associated with PPP Scheme relative to initial estimates.

5.2 Timing of PPP Scheme Implementation

As part of its 2000 Best Practice Guidelines, the Department of the Taoiseach (DOT) stated that a PPP approach should be adopted wherever it would "*accelerate the implementation of a particular project*". In the Framework for Public Private Partnerships - Working Together for Quality Public Service, published by the Social Partners in 2000, the principles underpinning the PPP programme were set out, including: "*PPPs should maximise the benefits of private sector efficiency, expertise, flexibility and innovation*".

Table 5.1 and Table 5.2 set out the procurement and construction periods associated with the M7/M8 Portlaoise to Cullahill/Castletown PPP Scheme.

Table 5.1 Procurement Timelines

Date	Task
Pre Qualification	
September 2005	OJEU Notice
ITN Tender Phase	
January 2006	Short Listing of Tenderers
March 2006	Tender Invitation Documents Issued
July 2006	Submission of Tenders for Short Listing
BAFO Tender Phase	
January 2007	BAFO Invitation
March 2007	Receipt of BAFO Submissions
June 2007	Contract Award
Road Opening	
May 2010	Road Opening

Source: NRA

Table 5.2 M7/M8 Portlaoise to Cullahill/Castletown PPP Scheme Timelines

	No of Months
Start Procurement - end Procurement	21
Start Construction - end Construction	35
Start Procurement - end Construction	56

The procurement period, from date of first issue of the OJEU notice to contract award to the successful PPP bidder, totalled 21 months. The PPP contract was awarded to the successful bidder in June 2007. The motorway Scheme was opened 35 months later, in May 2010.

It was not possible to identify equivalent procurement and construction timeframes for roads of a similar scale to the M7/M8 Portlaoise to Cullahill/Castletown scheme¹². As such, the review of the scheme's timeliness is restricted to a review of the targets set for the scheme. The motorway scheme was scheduled to be complete in September 2010. The actual motorway opening took place in May 2010, four months ahead of schedule.

5.3 Quality of PPP Scheme Implementation

In reviewing the PPP Scheme's implementation, a number of key areas were reviewed:

- the delivery of the scheme to the specification of the PPP contract;
- the management procedures put in place by the NRA; and
- the contract management in the design, construction and operational phases.

5.3.1 Delivery of Key Element of the Scheme

The M7/M8 Portlaoise to Cullahill/Castletown was delivered in line with the contract specification. There have been no issues relating to the quality of the scheme post completion that have not been addressed speedily by the concessionaire, in line with the terms of the contract.

5.3.2 PPP Management by the NRA

The progression of the scheme was managed by a newly established PPP unit within the NRA. In line with published guidance, the NRA contracted legal, financial and technical advisers to assist with:

- the devising of an appropriate procurement mechanism;
- the drawing up of detailed contract documents; and
- assessing and selecting PPP consortia for the scheme.

To date, the management of the PPP Scheme contract has run smoothly. The PPP Concessionaire, in line with its obligations, has provided the NRA with its reporting requirements, including: Winter maintenance reports; Annual reports; Annual performance reports; five yearly management plans; and Monthly O&M reports.

5.3.3 Contract Management during Design and Construction

The NRA contracted technical engineers to project manage the design and construction of the scheme on its behalf. Over the course of the construction period, the NRA was provided with a monthly construction period report.

5.3.4 Contract Management during Operation

The NRA's management of the operational phase of the PPP contract has operated on the same basis as the design and construction phase, namely technical support has been contracted in as required. NRA staff members are allocated supervisory roles for individual PPP Schemes. As part of this supervisory role, the NRA staff member is responsible for reviewing the reports provided by the PPP Concessionaire, making on-sites visits to the scheme and administering the contract.

¹² Such a comparison would be possible if the schemes in the PPP programme were compared to a sample of similar non PPP road schemes.

5.4 Outturn Cost of PPP Scheme

One of the key principles underpinning the implementation of PPP infrastructure projects in Ireland is the obtaining of better Value for Money for the NRA and the Exchequer. The Department of Finance PPP Implementation guidance (see Appendix A) stated that Ex-Post Reviews of PPP Schemes should contain a comparison of the actual PPP outturn costs (as provided for in the PPP contract¹³) with the initial estimated costs of the Scheme (as set out in the Financial Comparator).

The actual PPP outturn cost to the Exchequer is identified in the PPP contract and as such, the PPP outturn cost remains unchanged except where:

- any variation costs are potentially introduced after financial close; and/or
- the revenue share/royalty payments payable from the PPP Scheme are different to those estimated in the tender evaluation process.

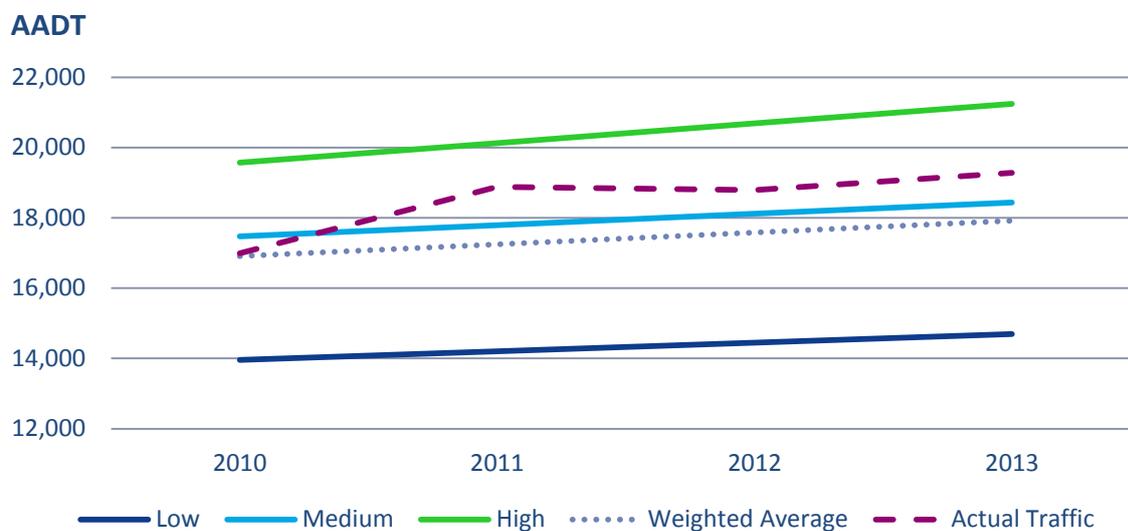
The estimated NRA costs associated with the preferred PPP option totalled a net cost of €54 million (see Table 4.1).

Since the signing of the PPP contract with the concessionaire no revenue share payments have arisen. This is in line with expectations at contract award.

5.4.1 Traffic Levels

Table 5.3 and Figure 5.1 below set out a comparison of the NRA traffic forecasts used as part of the VFM Assessment process and the actual traffic volumes which have materialised since the opening of the scheme in May 2007.

Figure 5.1 : Forecast NRA and Actual Traffic Volumes (Source: NRA)



¹³ The actual costs incurred by the PPP Concessionaire in providing the infrastructure and services as per the specification incorporated into PPP contract is unknown, because the Concessionaire is not required to provide this information. The outturn cost data that is available relates to the estimated outturn NRA costs associated with the PPP Contract, as signed by the Concessionaire at Financial Close. This cost estimate incorporates any agreed contributions to construction and operational costs payable by the NRA to the Concessionaire less any revenue share payable to the NRA.

Table 5.3 Forecast NRA and Actual Traffic Volumes

Year	Low Forecast	Medium Forecast	High Forecast	Weighted Average [^]	Actual Traffic	% Difference Actual v Med	% Difference Actual v WA
2010	13,957	17,472	19,570	16,908	16,994	-2.7%	0.5%
2011	14,202	17,793	20,128	17,246	18,877	6.1%	9.5%
2012	14,448	18,115	20,685	17,584	18,789	3.7%	6.9%
2013	14,693	18,436	21,243	17,921	19,279	4.6%	7.6%

Source: NRA

[^]Weighted Average is composed of 25% Low Forecast, 60% Medium Forecast, 15% High Forecast

As Table 5.3 highlights, aggregate traffic volumes annually have been in excess of the medium and weighted average traffic forecasts since the opening of the M7/M8 Portlaoise to Cullahill/Castletown Scheme in May 2010. The traffic levels exceeded the medium traffic forecast used in the VFM by 5% in 2013.

The VFM assessment estimated 10.4% of traffic would be heavy vehicles (i.e. HGVs and Buses/Coaches). Since opening, the M7/M8 Portlaoise to Cullahill/Castletown Scheme has seen heavy vehicles share increase from 8% to approximately 10%.

Table 5.4 Heavy Vehicles as a Proportion of all Vehicles

Year	Heavy Vehicles as a Proportion of all Vehicles
VFM	10.4%
2010 Actual	8.2%
2011 Actual	9.0%
2012 Actual	9.4%
2013 Actual	9.8%

Source: NRA

Therefore it can be concluded the vehicle shares used in the VFM have largely been realised.

5.4.2 Revenue Share Payments

The traffic volumes in the initial years of the motorway opening have resulted in no revenue share payments being made to the NRA. This is in line with forecasts at contract award.

5.4.3 Implications for Total Outturn Cost associated with PPP Option

As set out above, initial traffic levels using the M7/M8 Portlaoise to Cullahill/Castletown Scheme have been largely in keeping with the levels forecast as part of the Value for Money assessment process.

The growth assumptions used in the VFM are examined against current NRA guidance in Table 5.5 below.

Table 5.5 Growth Assumptions Used in Value for Money (VFM) and Current Guidelines

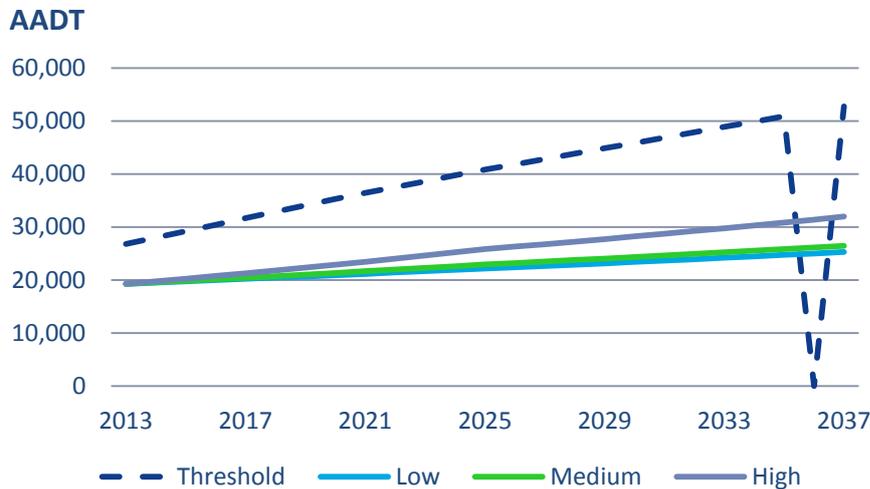
	2010-2025				2026-2040			
	Non-HGV		HGV		Non-HGV		HGV	
	PAG	VFM	PAG	VFM	PAG	VFM	PAG	VFM
Low	1.2%	1.7%	0.8%	1.7%	1.2%	1.1%	0.1%	1.1%
Medium	1.5%	1.8%	1.0%	1.8%	1.3%	1.6%	0.1%	1.6%
High	2.5%	2.7%	2.1%	2.7%	1.9%	2.0%	0.7%	2.0%

Source: BAFO Evaluation Final Report, M7/M8 Portlaoise Motorway, March 2007 (VFM) and NRA Project Appraisal Guidelines (PAG), Unit 5.5 Link-Based Traffic Growth Forecasting (January 2011)

It is clear that the growth rates used in the VFM process are higher than the current NRA guidance for the Central East region in which the scheme is located.

The traffic levels have been forecast using the traffic volumes in 2013 and the current NRA Project Appraisal Guidelines for traffic growth. The results are shown in Figure 5.2.

Figure 5.2 Traffic Forecast (based on PAG growth rates) and Threshold for Revenue Share



Source: AECOM Estimates

It can be seen that the forecast traffic volumes are much lower than the threshold at which a revenue share is payable. The notable exception is in 2036 when all traffic will be a subject to a revenue share payment. This revenue share expectation is in line with NRA's forecasts at contract award.

Therefore the €5 million NPV which was estimated as part of the VFM assessment is likely to be realised.

5.5 Summary

The M7/M8 Portlaoise to Cullahill/Castletown Scheme's implementation was reviewed in terms of the timing of the scheme, the quality achieved by the scheme and the actual materialised costs of the scheme against initial estimates.

The construction of the scheme commenced in June 2007 and completed in May 2010, four months ahead of schedule.

The scheme was delivered in line with the specification set out in the concession contract. There have been no issues relating to the quality of the scheme post completion that have not been addressed speedily by the concessionaire, in line with the terms of the contract.

Since the opening of the M7/M8 Portlaoise to Cullahill/Castletown Scheme, the traffic volumes using the motorway have marginally exceeded those forecast as part of the VFM assessment process. As expected, there were no revenue share payments paid to date.

Due to the high traffic growth forecasts estimated by the tenderer, the threshold at which a revenue share is paid is well in excess of the likely traffic volumes (with the exception of one year, 2036, which has no minimum traffic threshold). The revenue share of €5 million (NPV) which was estimated as part of the VFM assessment is likely to be realised.

6 Summary and Conclusions

The M7/M8 Portlaoise to Cullahill/Castletown Scheme was adequately planned both in terms of the statutory procedures, appraisal, routes selection and consultation and the planning undertaken in relation to the decision to procure the scheme as a Public Private Partnership (PPP).

One exception was that the scheme appraisal was carried out three years prior to the contract being awarded and six years prior to the scheme opening. In the interim, there was no re-appraisal to account for changes in cost and traffic forecasts. Based on a comparison between actual traffic volumes and those used in the appraisal, the net economic benefit of the scheme will be reduced but remain positive. The appraisal approach adopted was in line with the available guidance at the time and a revised cost-benefit analysis at the tendering stage now forms part of the NRA Project Appraisal Guidelines. This addresses this shortcoming for all current/future scenarios.

The scheme has delivered on its objectives and the expected benefits and outcomes have materialised. The scheme has helped to reduce traffic volumes and congestion in towns along the old N7 and N8 routes and contributed to providing a continuous motorway route linking Dublin to Cork and Limerick.

During the implementation of the scheme, the appropriate management procedures adopted were satisfactory and in line with best practice guidance at the time. The implementation of the scheme as a PPP resulted in the scheme being delivered ahead of schedule and in line with the quality specified in the PPP contract.

A review of the materialised traffic volumes on the scheme and current traffic forecasting procedures determined that the PPP outturn cost will not differ substantially to the level forecast in the Value For Money Assessment. The cost associated with the Financial Comparator was higher than the average of tenders by 27%. However, the difference in cost to the public sector between traditional procurement and PPP remains substantial.

It is therefore considered that the decision to procure the scheme as a PPP represents value for money for the Exchequer.

Appendix A: Overview of PPP Guidance

Developing the Infrastructure Requirements of the National Development Plan: Best Practice Guidelines for Project Implementation, Department of the Taoiseach, 2000

As part of its 2000 Best Practice Guidelines, the Department of the Taoiseach (DOT) stated that a public private partnership approach should be adopted wherever it would accelerate the implementation of a particular project and represent better value for money over the full life cycle of the project. The DOT also stated that the most appropriate form of PPP (ranging from design and build to design, build, finance and operate) should be adopted having regard to the particular circumstances of the individual project.

Framework for Public Private Partnerships, Working together for Quality Public service. 2000

In 2000, a framework document endorsed by IBEC, ICTU, CIF, the Department of Finance and the Departments and Agencies engaged in the PPP process was published by the Social Partners. In the Framework a clear statements of the principles underpinning the PPP programme were set out, namely:

- PPPs should yield value for money for the Exchequer;
- PPPs should allocate risks to the party best able to control and manage them; and
- PPPs should maximise the benefits of private sector efficiency, expertise, flexibility and innovation.

A Policy Framework for Public Private Partnerships (PWC), DOEHLG 2000

In 2000, the then Department of Environment, Heritage and Local Government commissioned PWC to produce a framework within which PPP projects could be advanced in the roads, water and waste sectors. The resultant Policy Framework detailed policy guidance covering each stage in the development, implementation and management of PPP projects. Some of the key guidance points identified in the resulting policy framework document include:

- **Market soundings** should be undertaken to determine the level of interest among the private sector and the capability of the private sector market to undertake prospective PPP projects.
- An **Output Specification** should be prepared which defines the services required by the public sector which the private sector would be responsible for providing as part of a PPP project. The actual design of the works necessary to deliver that service would be left to the successful private sector tenderer.
- A key driver of the PPP programme is the desire to increase **Value for Money (VFM)** in infrastructure procurement. To ensure that value for money is achieved, the Contracting Authority should be able to demonstrate that the option selected offers better value for money than the alternatives. The VFM assessment should not be seen as a single step but one that is carried through the life of the project. An initial PPP Assessment should be completed at the Option Appraisal stage to determine the potential for a PPP to deliver improved value for money compared with a traditional procurement. The final VFM assessment can only be made at the conclusion of the procurement process.
- In the case of projects where the public sector is the sole or main purchaser, the VFM undertaken at the end of the procurement process should comprise two key elements:
 - Monetary comparison – a comparison of the cost of the preferred Public Private Partnership tender, with the cost of traditional public sector procurement (the Financial Comparator), expressed in terms of discounted cashflows over the life of the PPP contract; and
 - Non-monetary comparison – a comparison of all the factors that are difficult to quantify in monetary terms, but their value to government and the wider public is significant. Examples include speed of project delivery, quality of service, and security of supply.
- One of the principles underlying PPPs is that risk should be allocated to the party best able to manage it. A detailed **risk assessment** should be undertaken for every PPP project.

- Central and Contracting Authorities will need to retain legal and financial advisers, as well as technical specialists, especially for Design, Build, Operate and Finance contracts and Concession contracts.

Policy Framework for Public Private Partnership (PPP) in Ireland: Project Implementation in the Local Government Sector, DOEHLG, Nov 2003

In 2003, the then Department of Environment, Heritage and Local Government published a policy framework document to guide the local government sector in the implementation of PPPs. The guidance highlighted the steps which all public projects must follow to ensure that the projects are properly examined and assessed, that the necessary statutory and administrative approvals are obtained, and that the procurement process is carried out in an efficient manner. It also highlighted the PPP specific tasks in relation to those steps, as follows:

- Project Identification – on the basis of an established business case/need for a project, the project receives the approval of a Sanctioning Authority. If a PPP approach is being considered some **market soundings** may be carried out to establish if there is market interest in the project.
- Option appraisal – during this phase various options for carrying out the project are examined, if the preferred option is a PPP, a PPP assessment report is completed which: determines the form the PPP will take; and establishes the **optimum allocation of risk** between public and private sector. Stakeholder consultation is carried out as part of a PPP Assessment Report. If the PPP procurement route is chosen, Department approval is sought before a Project Auditor is chosen, external advisors appointed, and a project steering group established.
- Statutory processes – the LA is responsible for preparing the project to go to procurement, including ensuring that the various planning and land acquisition and access consents are obtained.
- Pre-procurement - a **Public Service Benchmark (PSB)** cost is prepared, Departmental approval is sought for the project to go to procurement and an affordability cap is set based on the PSB.
- Procurement – the project is taken through the procurement process, when completed a tender recommendation report is submitted, and Departmental approval is sought to go to construction.
- Construction and operation – the contractor commences construction, variations may need to be referred to Department. When the LA is satisfied with the infrastructure provided, it signs off on the project and the operational contract commences.
- **Review of the PPP Process** – the performance of the project is reviewed
- Expiry of Contract

The Review of the PPP Process refers to the review of the performance of the project. As part of the policy framework document, the DOEHLG identified the objectives associated with the post project review of PPPs as follows:

- provide data on costs as an input to assessments (Public Sector Benchmarks) of subsequent PPP projects;
- provide public authorities with information on the economic benefits, or otherwise, of the PPP approach over alternative procurement approaches;
- identify the strengths and weaknesses in the systems in place for managing PPP projects.

It was noted that the Review of PPPs should contain the following:

- a brief description of the project;
- an outline of the project history with key decisions /events highlighted;
- a variance analysis of the final outturn costs of the project compared against initial estimates, the PSB, Affordability Cap and the Final Contract price;

- an analysis of the time taken to complete different stages of the project compared with projections; and
- the extraction of selected costs for the Department's database of costs on PPP projects.

Guidelines for the Provision of Infrastructure and Capital Investments through Public Private Partnerships: Procedures for the Assessment, Approval, Audit, and Procurement of Projects, 2006, Department of Finance

The Department of Finance (DOF) 2006 Guidelines for the Provision of Infrastructure and Capital Investments through Public Private Partnerships replaced Interim Guidelines published by the DOF in July 2003. The 2006 DOF Guidelines identified four distinct strands or functions associated with PPP projects as follows: the project appraisal function, the approval function, the procurement function and the audit function. Best practice would require an appropriate separation of functions between these strands.

1. The Sponsoring Agency is responsible for appraising projects. As part of the Detailed Appraisal, the Sponsoring Agency should determine the most appropriate procurement mechanism and, if a PPP approach is being considered, a PPP Procurement Assessment should be carried out.
2. Following appraisal of the proposed project, the Sponsoring Agency should approach the Sanctioning Authority for approval to proceed with the procurement of the project as a PPP.
3. PPP projects must be procured in line with all regulatory and EU procurement requirements in regard to tendering and bid evaluation.
4. There is a particular audit requirement in regard to PPP which is additional to the requirements outlined in the *Capital Appraisal Guidelines*, i.e. the appointment of a Process Auditor. A Process Auditor must be appointed for all PPP projects or grouped PPP projects where the capital cost is in excess of, or is likely to exceed, the limit specified by the Department of Finance (then €20 million).

Some of the key guidance points identified in the DOF 2006 Guidelines include:

- **Affordability:** A Sanctioning Authority should not allow a project to proceed unless it is satisfied that the overall capital cost of the project as a whole, including both PPP and non-PPP elements, can be accommodated within the Capital Envelope allocation(s) available to the Sponsoring Agency.
- **Value for Money:** VFM needs to be considered at two levels:
 - The overall VFM of the project – i.e. does the project as a whole offer good value for money; and
 - The VFM of the PPP contract – i.e. do the aspects of the project that are being procured by PPP represent good value for money, particularly when compared with the cost of achieving the same objective by traditional procurement (as represented by the Public Sector Benchmark (PSB)).

Four formal VFM tests should be carried out at the following points:

1. at PPP Procurement Assessment – a test carried out to determine whether, and in what form, a PPP arrangement has the potential to offer the best value for money solution for the procurement;
2. at Completion of the Public Sector Benchmark (PSB) – to determine whether, in light of the quantifications in the PSB, the conclusion reached in the PPP Procurement Assessment still holds;
3. at Tender Evaluation stage - to compare the highest ranking bid against the PSB, to assess whether the highest ranking bid offers a potential value for money solution; and
4. at Financial Close – a final test carried out (a) to assess the impact of any changes in the interest rate and/or discount rate and (b) where the project has been procured using the

Negotiated Procedure, to examine the effect of any proposed changes in the contract terms.

- The Sponsoring Agency should draw up a detailed **Output Specifications** for the project, focusing on outputs rather than inputs.
- A **Public Sector Benchmark (PSB)** - a comprehensive estimate of the cost (including risk valuations) of procuring those elements of the project that the private sector is to be invited to tender for in the PPP contract - is derived from the Output Specifications. The final PSB cost should be expressed in Net Present Value (NPV) terms, thereby reflecting the time value of money. The Output Specifications and PSB should be finalised and should be up to date before any tender invitations are issued.
- In any procurement competition, all of the tenders received are first examined to determine whether they are "suitable" bids. Having identified the highest ranking bid received, the next step is to examine the value for money of that bid.
- As part of a **Post Project Review** a comparison of the actual outturn costs of the project (as provided for in the contract) with the initial estimated costs (as set out in the PSB) should be undertaken and recorded. A Post Project Review aims to draw lessons for the future and, therefore, any significant lessons learned from the review should be translated into changes in the Sponsoring Agency's project practices. Each Sponsoring Agency should maintain a cost database which should be used when benchmarking costs for future projects and in the compilation of future Public Sector Benchmarks. The post project review exercise should be used to inform and update this database with the latest available information. In addition, each sector should maintain a sector-specific risk database.
- In many instances, a PPP contract will include clauses that link payment to performance of specific obligations under the contract. In order to ensure that the full benefit is derived from these clauses, it is essential that the performance of the private sector partner is constantly monitored over the contract term and that these clauses are invoked, as appropriate.

Appendix B: Review of Components of Financial Comparator

As previously identified, the cost and revenue items comprising the net NRA costs under the PPP scenario were not determined by the NRA, rather they were determined by the PPP Concessionaire on the basis of the Concessionaire's own estimates of the costs and toll revenues they would likely incur in providing and maintaining the infrastructure. The analysis below is thus restricted to reviewing whether the costs and revenues comprising the Financial Comparator were reasonable approximations of the costs and revenues attributable to the NRA under a traditional procurement scenario.

There are three core elements comprising the net NRA costs associated with the traditional procurement (Financial Comparator) scenario. These are namely:

- overall construction, operational and lifecycle costs associated with constructing and operating the Scheme (including the road and tolling facility);
- values assigned to the risks (both cost and revenue) assumed by the NRA; and
- the revenue from tolls.

The assumptions used in the VFM assessment with respect to each of these components are reviewed in Sections B1 – B3 below.

B1 Construction, O&M and Lifecycle Cost Estimates used in FC

The costs for each element as estimated in the original Financial Comparator (at ITN stage) are compared to the estimates provided by the five shortlisted ITN bidders in Table B1 below.

Table B1 Base Tender Costs and per Pre-Tender Estimate (2006 prices)

	Capital Construction (€m)	O&M (€m)	Lifecycle (€m)	Total (€m)
Non Risk adjusted Pre-tender estimate	406.8	144.5	73.0	624.3
Tender 1	████	████	████	413.3
Tender 2	████	████	████	568.9
Tender 3	████	████	████	546.2
Tender 4	████	████	████	508.5
Tender 5	████	████	████	421.3
Average of Tenders	290.4	165.9	35.3	491.6

Source: M7/M8 Portlaoise PPP Scheme, Tender Evaluation – Final Report, Technical Evaluation, Table 1 (November 2006)¹⁴

On the basis of the data provided in Table B1, it is concluded that on aggregate, the overall cost estimates used in forming part of the Financial Comparator at ITN were too high. The total costs used in the pre-tender estimate exceed the average total cost from the five tenders by 27%.

¹⁴ It should be noted that the pre-tender estimate figures presented in Table B1 represent the construction, O&M and lifecycle cost estimates at ITN stage (presented in nominal terms), and are thus not directly comparable to the Base Cost total presented in Table 4.1 which relate to the NPV of construction, O&M and lifecycle costs forming the FC at the BAFO stage

The primary difference was seen in the capital construction costs which were 40% higher than the average of tenders.

B2 Review of Risk Cost and Revenue Estimates in FC

Risk analysis formed an important element of the VFM assessment process. The approach to valuing of risk was based on a database of risk knowledge gained as part of the closing of three PPP deals, the preparation of five financial comparators for previous PPP Schemes, as well as information emerging from NRA Schemes procured using Design and Build methods. The approach used was to assign a generic range of probabilities to each major risk category (Capital, Operational, Lifecycle etc), on the basis of risk estimates from previous schemes. The probabilities were applied to the total cost estimates of each category to quantify the level of risk for the category as a whole.

Cost Risk

As set out in Table B2, the major *cost* risks retained by the NRA under the traditional procurement FC scenario related to: construction risks, which totalled circa €92 million or 25% of the total base construction costs; operating cost risks which totalled €7 million or 15% of the total base operating costs; and whole life cost risks totalling €5 million or 11% of the Scheme's whole life costs. The total cost risk value, which totalled €119 million or 20% of the total estimated Scheme costs, is considered to represent a broadly standard estimation of cost risks, in light of the history of cost overruns in previous road schemes.

Demand Risk

As part of the Financial Comparator, the forecast value of total Toll Revenue was estimated having recourse of the traffic forecasts. The value of demand risk is estimated based on 20% of Toll Revenue. In addition, there is a 2% demand risk that remains with the NRA even under the PPP scenario. The total demand risk is €60.5 million.

Table B2 Overview of Cost Risks in Financial Comparator (NPV 2001 Prices)

Risk Category	Overview of Risk Type	Allocation of Risk	€m (% of Relevant Base Costs)	Total Risks
Capital	Risks relating to construction including roadway and toll	FC – all retained by NRA PPP – all transferred to PPP Co	91.6 (25% of base construction costs)	
Operating	Risks relating to operation and maintenance include the risks of estimation errors, service non availability, inflation, third party claims	FC – all retained by NRA PPP – all transferred to PPP Co	6.9 (14.9% of base operating costs)	
Lifecycle	Risks relating to a poorer than expected performance of key construction elements and/or materials	FC – all retained by NRA PPP – all transferred to PPP Co	4.8 (10.9 % of base lifecycle costs)	
Tolling	Risks relating to operating and lifecycle costs	FC – all retained by NRA PPP – all transferred to PPP Co	15.4 (11.5% of base tolling related costs)	
Total Cost Risk				118,7
Demand	Risks relating to the uncertainty associated with the estimation of future traffic levels and ultimately toll revenues (not retained by NRA in PPP)	FC – all retained by NRA PPP – all transferred to PPP Co	55.0 (20% of total tolling revenues)	
	Risks relating to the uncertainty associated with the estimation of future traffic levels and ultimately toll revenues (retained by NRA regardless of contract type)	FC – all retained by NRA PPP – all retained by NRA	5.5 (2% of adjusted (80%) tolling revenues)	
Total Revenue/Demand Risk				60,5

Source: Financial Comparator as shown in Value for Money Assessment, M7/M8 Portlaoise PPP Scheme, June 2007

B3 Review of Toll Revenues in Financial Comparator

The key determinants of the estimated NRA toll revenues in the FC scenario were the forecast traffic volumes using the new motorway infrastructure.

Traffic Volumes

Since the opening of the M7/M8 Portlaoise to Cullahill/Castletown the traffic levels using the M7/M8 Motorway have been generally in keeping with the levels forecast (within circa 2%). Therefore, it could be argued that the realised toll revenue is likely to be much closer to the €275 million estimate in the VFM assessment (prior to the application of the 80% weighting). The revenue share associated with the PPP option would similarly increase from €5.3 million (80% weighting) to €6.6 million (100% weighting).

The €365 million difference in total risk adjusted cost to the public sector between the PPP option and the Financial Comparator would narrow to approximately €308 million. This assumes there is no risk associated with traffic volumes falling below forecast levels in the future. Nonetheless, the cost reduction to the public sector in opting for a PPP over a traditional contract type remains substantial.

Appendix C: Technical Note on Public Sector Benchmark

The following is an extract from the Technical Note on the compilation of a Public Sector Benchmark for a Public Private Partnership Project published by the Department of Public Expenditure and Reform which outlines current policy relating to disclosure of the Public Sector Benchmark.

“1.15 Disclosure of the Public Sector Benchmark

Current policy is that the PSB, or any elements thereof, is / are not made public during the tendering process on the basis that revealing the amount that the State is willing to pay may give tenderers an opportunity to increase their asking price above what they might otherwise seek. Where the public sector is likely to procure a similar project in the same or other sectors in the foreseeable future, the PSB (or any elements thereof) should not be released, even after the completion of the tendering process.

In the case of a once-off project, where it is not likely that there will be any similar procurement in the future, the release of the PSB after the contract has been signed could be considered, subject to the non-disclosure of risk valuations (see below). However, before releasing any of the PSB documentation, the Sponsoring Agency must be satisfied that none of the information being released could diminish the potential to secure value for money bids when procuring future projects.

If the Sponsoring Agency is satisfied that it is in order to disclose the PSB, it must advise the Sanctioning Authority of its intention to do so and of the basis for disclosure.

In no circumstances should the individual risk valuations set out in a PSB be disclosed and no information should be released in a format that would permit the identification of risk values. To do so would provide information on how the public sector values risk, which would prejudice the ability of the public sector to secure value for money in current and future projects through risk transfer. Similarly, it is important to ensure that information relating to the demand projections used in the development of a PSB for a Concession project (e.g., the Sponsoring Agency’s traffic forecasts for a toll road) is not disclosed.

Disclosure of any aspect of the PSB could have an adverse effect on the conduct by the Sponsoring Agency of PPP contract negotiations, particularly as information contained in the PSB could disclose positions taken in past or current negotiations and, indeed, positions that may be taken in future negotiations. Disclosure of the PSB, or elements thereof, may also give rise to an unwarranted loss to the Sponsoring Agency and/or an unwarranted gain to the private sector as access may be given to financial, commercial, industrial, scientific or technical information that belongs to the Sponsoring Agency.

The PSB, like other confidential and similar information relating to projects, is of course available to the Comptroller and Auditor General for inspection in connection with any reports his / her office may be progressing.”

N8 Rathcormac to Fermoy Bypass

Post Project Review



March 2014

Erratum Sheet

Post Project Review reports - Corrections

The Post Project Review reports were not originally intended for an external audience. There are in some cases errors in the reports with such errors ranging from typographical errors to in a small number of cases incorrect statements or errors in interpretation of the data (which have been identified as a consequence of subsequent reviews). We suggest that the following errata are taken into account when reviewing these reports.

2.2.2. *Need and Objectives (page 4)*

The National Roads Needs Study (1998) prepared by the Government.

Should read

The National Roads Needs Study (1998) prepared by the NRA.

2.3.6. *Compliance with Procurement, EIS and other Statutory Requirements (page 7)*

An Environmental Impact Statement (EIS) was prepared for the N8 Rathcormac to Fermoy Bypass in July 2001. Procurement of the scheme was via a Public Private Partnership (PPP) arrangement advertised in the OJEC in July 2001. The preferred tender was selected in December 2003 and the contract signed in October 2006.

Should read

An Environmental Impact Statement (EIS) was prepared for the N8 Rathcormac to Fermoy Bypass in July 2001. Procurement of the scheme was via a Public Private Partnership (PPP) arrangement advertised in the OJEC in July 2001. The preferred tender was selected in December 2003 and the contract signed in June 2004.

5.2. **Timing of PPP Scheme Implementation (page 17)**

A challenge on statutory procedures seeking a judicial review of the EIS caused a six month delay to the issuing of BAFO invitation documents. The PPP contract was awarded to the successful bidder in February 2004. The motorway Scheme was opened 19 months later, in September 2005,

The above text relates to the M1 Dundalk Western Bypass and not the Rathcormac to Fermoy Bypass.

Appendix B: Review of Components of Financial Comparator

Demand Risk (page B3)

Because the weighted average traffic forecasts did not differ substantially from the medium traffic, a relatively small value (not significantly different to the €4.5m (NPV) set out in Table 5.5 NPV) was attributed to this risk item.

Should read

Because the weighted average traffic forecasts did not differ substantially from the medium traffic, a relatively small value (not significantly different to the €4.5m (NPV) set out in Table B.4 NPV) was attributed to this risk item.

Table B5: Overview of Cost Risks in Financial Comparator (NPV 2001 Prices) (page B4)

Risk Category

Demand

Risks relating to the uncertainty associated with the estimation of future traffic levels and ultimately toll revenues. Total demand risk is comprised of reduced revenue due to limited inflation (71m); leakage of tolls (17.6m); user charging (2m) and late revenue collection (7m).

These risk values are incorrect. Please refer to Table B4 for Demand Risk values.

Important Notice

This report has been prepared by AECOM Limited. It is based on information and explanations provided by the National Roads Authority and has been prepared for the sole use of the National Roads Authority.

This Post Project Review report contains certain information of a commercially sensitive nature and should be kept confidential. This report contains information relating to tenderer's pricing and contains information on the Public Sector Benchmark. The PPP Guidelines (Technical Note on the compilation of a Public Sector Benchmark for a Public Private Partnership Project¹) published by the Department of Public Expenditure and Reform require public bodies to keep information relating to the Public Sector Benchmark confidential. This PPR report contains information relevant to the State's approach to evaluation of value for money in PPP competitions that the State may adopt in its future PPP competitions. Release of certain information contained in the Post Project review Report, whether on foot of freedom of information request or otherwise, would likely impact negatively on the State's commercial interests and would accordingly, not be in the public interest. In the event that you receive any request to disclose any information contained in the Post Project review report (whether pursuant to freedom of information legislation or otherwise), we would ask you to notify the National Roads Authority of this request prior to any disclosure being made so that our comments may be taken into account in any decision that might be taken in this regard.

¹ Appendix C contains an extract from the Technical Note on the compilation of a Public Sector Benchmark for a Public Private Partnership Project which outlines current policy relating to disclosure of the Public Sector Benchmark.

N8 Rathcormac to Fermoy Bypass

Post Project Review

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Appendix A: Overview of PPP Guidance

Appendix B: Review of Components of Financial Comparator

Appendix C: Technical Note on Public Sector Benchmark

1. Introduction

1.1. The Scheme

The N8 Rathcormac to Fermoy Bypass Scheme (the Scheme) connects Cork to Portlaoise and forms part of the strategic link between Dublin and Cork. The scheme was the third inter-urban PPP motorway scheme to open to traffic in Ireland, after the M1 Dundalk Western Bypass and the M4 Kilcock-Kinnegad schemes.

The PPP scheme comprises 17.5 km of motorway. The scheme involves the construction of 3 interchanges (at Rathcormac South, Corrin and Moorepark) and includes a 450 m long viaduct spanning the Blackwater Valley. In addition there are a further 18 structures constructed (comprising 7 overbridges, 2 underbridges, 1 service tunnel at the toll plaza, 4 river bridges and 4 underpasses) along with local road realignments. The route runs south to north between Watergrasshill Road and Moorepark.



Figure 1.1: Map of Rathcormac to Fermoy Bypass PPP Scheme

Procured as a Public Private Partnership (PPP) project, the contract was awarded in June 2004 to the DirectRoute Consortium, and will extend for 30 years from that date. In October 2006 the scheme was opened. Built as part of a concession PPP Scheme, users of the motorway are tolled in accordance with the Toll Byelaws developed for the Scheme.

This report comprises a Post Project Review of the N8 Rathcormac to Fermoy Bypass PPP Scheme.

1.2. Guidelines for Post-Project Review

Post Project Reviews are typically carried out a few years after the opening of a scheme. This allows the reviewer to make an initial assessment of the performance of the scheme.

The current standards for Post Project Reviews (PPR) of capital infrastructure projects are those set out in the *'Public Spending Code'* issued by the Department of Public Expenditure and Reform (DPER). This Code specifies that the aim of such a PPR is to determine whether:

- The basis on which a project was undertaken proved correct;
- The expected benefits and outcomes materialised;
- The planned outcomes were the appropriate responses to actual public needs;
- The appraisal and management procedures adopted were satisfactory; and,
- Whether conclusions can be drawn which are applicable to other projects, to the ongoing use of assets, or to associated policies.

Since the early 2000s successive guidance documents have been published by various Government departments which set out the recommended steps that should be undertaken when implementing PPP projects in Ireland to ensure better Value for Money for the Exchequer.

The available guidance at the time includes interim guidelines published by the Department of Finance² and a policy framework by the Department of environment Heritage and Local Government³. Both of these were published in 2003 at which point planning for the scheme was well advanced. An overview of PPP guidance is provided in Appendix A.

The PPP guidance that was in place at the time the M8 Rathcormac to Fermoy Scheme was being planned was not as comprehensive as the current guidelines and, most notably, was not specific to road schemes.

The available guidance allowed the identification of some of the key areas that should be covered when completing Post Project Reviews of PPP Schemes, including

- Reviewing the PPP planning steps;
- Reviewing the PPP procurement decision; and
- Reviewing the PPP scheme implementation.

Similarly the NRA's project appraisal guidance has evolved through the years with the NRA's Project Appraisal Guidelines (first published in 2008⁴) determining the current recommended process to be followed.

On the basis of the overview of the guidance above, a two part approach to this Post Project Review was adopted. In the first instance, a value for money review of the scheme itself was undertaken, identifying the established project need, whether the project design process was properly planned, and whether the project is delivering benefits in excess of costs.

² Interim Guidelines for the Provision of Infrastructure and Capital Investments through Public Private Partnerships – Department of Finance, July 2003

³ Policy Framework for Public Private Partnership (PPP) in Ireland – Department of the Environment Heritage and Local Government, November 2003. Note: Appendix 1 of the framework document provides a detail of the key documents in the PPP area prior to 2003

⁴ The Project Appraisal Guidelines were first published in 2008 and have developed incrementally from that point

The second part of this Post Project Review (PPR) comprises a value for money review of the decision to procure the scheme as a PPP. This includes a review of the PPP pre-planning steps undertaken, a review of the PPP procurement decision, and a review of the PPP scheme implementation to date in terms of expected outcomes.

1.3. Layout of the Report

The broad structure of PPR is as follows: Section 2 outlines a traditional Post Project Review of the N8 Rathcormac to Fermoy Bypass as a scheme. This is in line with the NRA *Project Appraisal Guidelines* (PAG), the DPER *Public Spending Code* and the Department of Transport's '*Guidelines on a Common Appraisal Framework for Transport Projects and Programmes*', 2009.

Sections 3-5 focus on a review of the procurement of the scheme as a Public Private Partnership (PPP). Section 3 reviews the pre planning steps carried out by the NRA prior to procuring the scheme as a PPP. Section 4 reviews the basis of the decision to procure the scheme as a PPP, while Section 5 is concerned with the PPP project outturn relative to the outturn anticipated.

Finally Section 6 presents a summary of the PPR findings and recommendations.

2. Scheme Review

2.1. Introduction

As identified in Section 1, the '*Public Spending Code*' identifies a number of questions that need to be answered as part of a Post Project Review of a scheme. The approach taken here to address the requirements of the Code is to identify key stages in the scheme development and the key questions regarding each stage that address the requirements set out in the Code, as follows⁵:

- Scheme Conception
- Scheme Planning
- Scheme Implementation
- Scheme Operational Performance

2.2. Scheme Conception

2.2.1. Background

The Rathcormac to Fermoy Bypass Scheme was selected by the National Roads Authority (NRA) for development as a PPP scheme on the basis that a PPP could deliver a high quality route that would offer a greatly improved service for users of the then existing N8, that would be capable of accommodating significant traffic volumes.

The scheme was developed as a PPP scheme on the basis that a PPP could deliver

- (i) value for money when compared to traditional procurement;
- (ii) facilitate the injection of private finance and accelerate the delivery of the national road improvement schemes to reduce Ireland's infrastructural deficit; and
- (iii) ensure a high quality route that would offer a greatly improved service for users of the then existing N8, that would be capable of accommodating significant traffic volumes.

2.2.2. Need and Objectives

Prior to the development of the scheme, the N8 national road passed through Watergrasshill village, crossed the River Bride and proceeded into Rathcormac village. At Rathcormac, the N8 was intersected by the R614 and the R626 regional roads. The route then continued north passing through Fermoy town centre, where it crossed the River Blackwater. At Fermoy the N8 was crossed by the N72, the national secondary route connecting Killarney and Dungarvan.

It was identified in the EIS prepared for the scheme that the alignment of the N8 through Fermoy was particularly poor, resulting in considerable delays for through traffic at peak periods. In addition to passing through towns and villages, the existing N8 had a significant number of frontage accesses.

The National Roads Needs Study (1998) prepared by the Government recognised the need to remove a significant volume of long distance traffic passing through the towns and villages along the N8. In response, the NRA gave an undertaking to upgrade the existing substandard single carriageway along the N8 to motorway standard, reclassified as a motorway.

As part of the EIS it was identified that the provision of the Rathcormac to Fermoy Bypass Scheme would:

- provide a bypass facility for the communities of Rathcormac and Fermoy;
- result in significant reductions in travel times along the route;
- improve the safety and environmental conditions along the existing N8 particularly for local traffic, pedestrians and cyclists;

⁵ A more detailed summary of the relevant stages and key questions are set out in Appendix 1.

- remove through traffic from the local road network, thereby relieving congestion and improving environmental conditions and safety within the communities concerned; and
- enhance the economic opportunities in the region, while complementing other ongoing and planned infrastructural investments and programmes.

2.3. Scheme Planning

2.3.1. Current NRA Project Management and Appraisal Guidance

The present day guidelines were not in place at the time the N8 Rathcormac to Fermoy Bypass was being developed. Indeed, the experience of this and other similar schemes is likely to have been an input to the development of the current guidelines. Nonetheless it is useful to examine the present day guidance.

As part of the NRA's current Project Management Guidelines (2010) and Project Appraisal Guidelines (2008 onwards) there are a number of recommended steps involved in the planning of a new road development. These are summarised in Table 2.1.

Table 2.1: Summary of Key Deliverables as per Current Guidance

Phase	Project Management Guidelines Deliverables	Project Appraisal Guidelines Deliverables
2 – Route Selection	Public Consultations Route Selection Report Variation to County Development Plan Public display (preferred route)	Traffic Modelling Report Cost Benefit Analysis Updated Project Brief Preliminary Business Case Project Appraisal Balance Sheet
3 - Design	Design Report	Revised Traffic Modelling Report CBA (using Target Cost and Total Scheme Budget)
4 – Statutory Processes	EIS/CPO documents	Revised Traffic Modelling Report CBA (using Target Cost and Total Scheme Budget) Updated Project Brief Revised Project Appraisal Balance Sheet Business Case
5 – Tender & award	Tender Documents Tender Report	Updated Traffic Modelling Report Updated Cost Benefit Analysis Updated Project Brief Updated Project Appraisal Balance Sheet Final Business Case

Source: NRA Project Management Guidelines 2010

2.3.2. Guidance in Place at Scheme Preliminary Design Stage

Both the 2010 Project Management Guidelines and the 2008 Project Appraisal Guidance were put in place by the NRA post the implementation of the scheme. Some of the scheme's Preliminary Design Stage also pre-dated the NRA's 2000 Project Management Guidelines and the DOT 2004 published '*Parameter Values for Use in Cost-Benefit Analysis of Transport Projects*'.

The main source of appraisal guidance in place at the time of the implementation of the scheme was the UK Design Manual for Roads and Bridges (DMRB) and the UK Treasury Taskforce policy

statements and technical notes⁶. In addition, the National Roads Needs Study (1998), included forecast traffic growth on the national road network in Ireland over the period to 2019.

2.3.3. Traffic Analysis and Forecasting

Traffic analysis was undertaken in 2001 for the Rathcormac to Fermoy Bypass Scheme. As part of the traffic analysis, some traffic surveys were undertaken which were supplemented by some data from automated traffic counters. A spreadsheet approach to traffic modelling was used, assigning traffic according to the origin-destination surveys and journey time survey data. As part of the analysis, two traffic growth scenarios were modelled included:

- A low traffic growth scenario. based on the rate of growth as set out in the National Roads Needs Study for National Primary Routes; and
- A high traffic growth scenario based on growth rates identified from four automated traffic counter sites over three years on the N8.

The traffic growth rates modelled equate to an approximate average growth rate of 2.5 and 4.1 percent per annum over the design period in the low and high growth scenarios respectively.

It is not possible to comment on the approach taken to modelling the potential diversion away from the tolled motorway, as no detailed traffic modelling report was available for review. The available information in relation to the traffic modelling discusses the impact of tolling on traffic, particularly toll avoidance.

The traffic analysis included high and low growth scenarios, and lacked central traffic forecasts. Also, the three year trend period upon which the high growth traffic growth scenario was based is considered a very short period upon which to base long term traffic growth.

Table 2.2: Forecast Daily Traffic Flows on N8 Rathcormac to Fermoy Bypass

	Opening Year 2003		Design Year 2018		Annual Avg % Change Low	Annual Avg % Change High
	Low	High	Low	High		
AADT	13,900	16,000	20,000	29,100	2.5	4.1

2.3.4. Route Selection and Preliminary Design

In identifying the preferred route for the scheme, the route option analysis was divided into two parts: the Rathcormac Bypass and the Fermoy Bypass.

The route selection process for the Fermoy Bypass section of the scheme commenced in the mid 1990s. The process considered three routes, one to the west and two to the east of the town of Fermoy. The Rathcormac route selection process also considered three alternative route corridors, which were developed into a series of route options. The three corridors included a bypass to the west of the town; a middle option, and one to the east. An analysis of the engineering, environmental and economic impacts of the various routes options formed the basis of the route selection process, in accordance with NRA 'National Roads Project Management Guidelines – March 2000'.

A project appraisal was not carried out at route choice stage.

2.3.5. Project Appraisal

An economic evaluation of the scheme was undertaken in 2002 using COBA10, and parameters as set out in the National Roads Needs Study – Volume 2, Chapter 6.

⁶ UK Treasury Taskforce "Policy Statement No. 2 – Public Sector Comparators and Value for Money" and "Technical Note No. 5 – How to Prepare a Public Sector Comparator"

Four scenarios were analysed including a high and low traffic growth scenario, with and without tolling. Each scenario was compared to a Do Minimum scenario. A 30 year evaluation period was used, with a 2005 opening year.

The costs of construction of the scheme as set out in the economic appraisal totalled €96 million (1996 prices). The costs of the scheme were compared to the forecast benefits which included time savings, vehicle operating costs and accident savings.

The results of the economic evaluation identified positive benefit / cost ratios ranging from 2.6 for low traffic growth with tolls to 4.8 under the high traffic growth with tolling scenario.

Table 2.3: Results of Economic Evaluation (1996 Prices)

	Low Traffic		High Traffic	
	With Tolling	Without Tolling	With Tolling	Without Tolling
Benefit / Cost Ratio	2.6	2.6	4.8	5.2
IRR	13.6	13.4	20.4	21.8

Source: N8 Fermoy / Rathcormac Bypasses COBA Analysis Technical Report 2002

2.3.6. Compliance with Procurement, EIS and other Statutory Requirements

An Environmental Impact Statement (EIS) was prepared for the N8 Rathcormac to Fermoy Bypass in July 2001. Procurement of the scheme was via a Public Private Partnership (PPP) arrangement advertised in the OJEC in July 2001. The preferred tender was selected in December 2003 and the contract signed in October 2006.

All of the above processes satisfied the statutory procedures at the time.

2.3.7. Adequacy of Consultation Processes

During the preliminary design phases of both the Rathcormac and the Fermoy sections of the scheme significant public and stakeholder consultation was held in March 2000 and April 2000 respectively.

2.4. Scheme Implementation

2.4.1. Scheme Management Structures

The preliminary design of the Scheme was carried out in accordance with the Design Manual for Roads and Bridges applicable at that time.

2.4.2. Scheme Schedule, Management and Costs

The scheme outturn in terms of the delivery of the scheme to the specification as set out in the PPP contract, the management of the PPP contract, the budget outturn, and the outturn schedule are explored in detail in Section 5.4, where the performance of the scheme is reviewed in terms of anticipated outcomes.

2.5. Scheme Operational Performance

2.5.1. Achievement of Objectives

The objectives of the scheme were to relieve congestion in the towns and villages along the N8 corridor, facilitate shorter travel times with associated cost savings, improve accessibility to the whole region, and contribute to a safer journey for users of the road corridor.

The achievement of such objectives largely depends on the success of the scheme in attracting traffic from the N8. In this context, the key question is whether the scheme has achieved the predicted level of traffic volumes.

2.5.2. Predicted versus Actual Traffic Volumes

The Tolling of the Proposed N8 Fermoy Bypass Technical Report 2001 contains traffic predictions over a 15 year period from 2003 to 2018 for the Scheme. Interpolating between these two dates yields the equivalent traffic predictions as set out in Table 2.4.

Table 2.4: Forecast and Actual Traffic Volumes AADT (including exempt vehicles)

Fermoy Bypass	Predicted Low	Predicted High	Actual AADT	Divergence with Low (%)	Divergence with High (%)
2004	14,241	16,651	-	-	-
2005	14,591	17,328	-	-	-
2006	14,949	18,033	-	-	-
2007	15,316	18,767	12,194	-20.4	-35.0
2008	15,692	19,530	13,075	-16.7	-33.1
2009	16,078	20,325	13,880	-13.7	-31.7
2010	16,472	21,152	14,697	-10.8	-30.5
2011	16,877	22,012	14,858	-12.0	-32.5
2012	17,291	22,908	14,647	-15.3	-36.1

As the Table outlines, since the road opening in 2007 (first full year of operation) the level of usage of the new motorway has fallen short of the low growth traffic scenario, In 2012, the level of usage of the motorway is more aligned with the level of usage forecast in 2005 (under low growth scenario). There are a number of contributory reasons for the lower than forecast level of usage of the motorway. In the first instance, the motorway opened in 2007, as the recession commenced in Ireland. In addition, the levels of traffic growth as per the original economic appraisal (2.5% per annum) were in excess of the levels of growth experienced over the 2007 – 2012 period.

Table 2.5, which sets out the traffic volumes at Rathcormac pre and post the Bypass Scheme opening, confirms there has been a substantial movement off traffic from the old N8 (now R639) onto the tolled motorway, both on the part of light and goods vehicles.

Table 2.5: Comparison of traffic volumes at Rathcormac pre and post scheme implementation

	Pre Motorway			Post Opening of Motorway			
	N8 Rathcormac North			R639 Rathcormac		M8 Rathcormac-Corrin	
	2002	2003	2005	2008	2010	2008	2010
All Vehicles AADT	13,042	13,723	15,763	7,009	6,452	12,319	14,123
HCVs AADT	1,617	1,839	2,144	827	587	1,309	1,257
Non-HCVs AADT	11,425	11,884	13,619	6,182	5,865	11,013	12,866

Source: NRA Traffic Counters

2.5.3. Traffic Operation and Road Safety Outcomes

There have been no issues relating to the operation of the motorway that have arose post completion that have not been resolved speedily by the concessionaire.

One of the objectives associated with the scheme was a reduction in the level of fatal accidents along the route.

An analysis of collisions that have occurred along the PPP Scheme corridor in the years prior to, and post the opening of the bypass was undertaken. The results of the analysis, presented in Table 2.6, reveal that there has been a significant reduction in the number of fatal and serious collisions since the opening of the scheme.

Table 2.6: Number of Fatal Road Collisions 2002 - 2011

Period	Collision Type	M8	N8 / R639	N8 / M8 Corridor
2002-2006	Serious	-	4	4
	Fatal	-	6	6
2006-2011	Serious	0	0	0
	Fatal	0	1	1

Source: RSA Collision Data

2.5.4. Overall Economic Return to the State

Since the scheme opening, it is clear that substantial, albeit lower than forecast, traffic volumes are using the tolled motorway, which is reducing the level of traffic congestion in the towns of Fermoy and Rathcormac. There has also been a significant reduction in the number of fatal collisions occurring along the route corridor since the scheme's opening.

As highlighted above however, the economic appraisal for the Scheme was not revisited at the Tender/Contract Award Stage, when revised cost and traffic forecast estimates were available for the Scheme. In the absence of such an economic appraisal it is difficult to gauge the net positive economic return to the State from the scheme.

A revised CBA at the tendering stage now forms part of the NRA's 2010 Project Appraisal Guidelines, which addresses this shortcoming for all current/future schemes.

2.6. Summary

An economic appraisal of the scheme at detailed design stage, confirmed the economic viability of the Scheme, identifying a 2.6 positive benefit / cost ratios for the low traffic growth with tolls scenario.

Since the scheme opening, lower than forecast traffic volumes are using the tolled motorway. The volumes using the motorway are clearly contributing to reducing the level of traffic congestion in the towns of Fermoy and Rathcormac, with associated time savings for both users and non-users of the motorway. There has also been a significant reduction in the number of fatal collisions occurring along the route corridor since the Scheme's opening.

The economic appraisal of the Scheme was not re-visited at tendering/procurement stage, when revised costs estimates and more up to date traffic forecasts associated with the Scheme were available. In the absence of such an economic appraisal it is difficult to gauge the net positive economic return to the State from the scheme.

A revised CBA at the tendering stage now forms part of the NRA's 2010 Project Appraisal Guidelines, which addresses this shortcoming for all current/future schemes.

3. PPP Pre-Planning Review

3.1. Introduction

This section reviews the pre-planning steps completed by the NRA in progressing the N8 Rathcormac to Fermoy Bypass Scheme as a PPP.

3.2. Background

A PPP is a partnership between the public and the private sector for the purpose of delivering a project. There is a sharing of project risks between the public and private sectors. A PPP project benefits from an accelerated implementation through the availability of private sector funding. This is particularly the case in situations of limited public finances, where access to private sources of funding allows the progression of projects that would not otherwise be possible.

A number of guidance documents have been published by the authorities with responsibility for implementing PPPs, since the first PPPs were procured in Ireland over ten years ago. A summary of some of the key PPP guidance documents is provided in Appendix A. There are a number of planning steps recommended when considering a Scheme as a potential PPP.

3.3. PPP Scheme Selection

The *National Development Plan (NDP), 2000 - 2006* included an objective for the concentration of investment on the five strategic national roads linking the main urban areas in the country, one of which was the N1 from Dublin to Belfast. The NDP confirmed the policy for PPPs on being the maximum usage of PPP consistent with the principles of efficiency and best value for money. Minimum targets for PPP private funding were included in the NDP, including 23% of the total €5.97 billion 2000 – 2006 road investment programme.

In mid-1999 the Government requested that the NRA examine a number of schemes, including a planned 17.5km length of dual carriageway on the Dublin-Cork route between Cork City and Portlaoise, to assess their potential as PPP schemes. The N8 Rathcormac to Fermoy Bypass scheme was announced as part of the NRA's Tranche II PPP roads programme in June 2000.

The NRA established certain key principles to guide its PPP road scheme selection analysis. These principles were as follows:

- The use of the PPP mechanism would not delay scheme delivery;
- An alternative toll-free route should be available for road users;
- Tolloed roads should be spread across the main national routes to create an equitable distribution of user-charging on the country's newly constructed road network;
- A road project needed to be a minimum of £30 million (€38m.) in value in order to produce value for money when using the PPP process; and
- A public subsidy would be considered for high cost schemes which could not be solely financed from tolls.

When examined in terms of these principles, the NRA determined that the N8 Rathcormac to Fermoy Bypass met the criteria as a potential PPP Scheme.

3.4. Shadow Bid Model

Prior to the commencement of the PPP tender process a Shadow Bid Model (SBM) was developed by the financial advisors (KPMG) to the NRA. The SBM included the following input information:

- Projected traffic and toll level information provided by the NRA's traffic advisors;
- Scheme costs provided by NRA and/or its technical advisers (Babtie Group); and

- Financing assumptions in relation to debt, equity and economic assumptions.

The SBM was used to run a variety of financial scenarios which illustrated (or 'shadowed') how a private sector bidder might approach the N8 Rathcormac Fermoy PPP scheme. The Shadow Bid Model is used to inform decisions in relation to the structuring of the transaction to be provided for in the tender requirements. An overview of certain financial related tendering requirements as provided for in the N8 Rathcormac Fermoy tender invitation documents are set out in the table below.

Key Features of N8 Rathcormac to Fermoy Scheme Tender Requirements

As part of the request for tenders process, the NRA put affordability limits on the construction and operational payments that could be requested from tenderers, as follows:

- The total construction payments would total the lower of €100m or 50% of total construction costs. In any one year they could not exceed €60m.
- The average operational payment over the contract period could not exceed €5m per annum.

Tenderers were required to share excess revenue with the NRA though a percentage of traffic revenue at different traffic levels. It was specified that revenue share would only be payable when aggregate traffic volumes exceeded 21,000 AADT. A 21,000 AADT was not expected under the NRA medium traffic scenario until approximately 2027.

3.5. Value for Money (VFM) Assessment

The PPP planning guidance states that the decision to procure a project as a PPP should be based on a VFM assessment. This assessment compared the costs of procuring the scheme by traditional means (the Financial Comparator) with the equivalent costs of procuring the scheme by means of a PPP.

VFM comparisons were undertaken at various stages in order to ensure the continuing rationale for procuring the Scheme through a PPP option. These stages are as follows:

- Prior to receipt of Invitation to Negotiate (ITN) Tenders;
- Following receipt of ITN Tenders; and
- Following the receipt of Best and Final Offers (BAFO).

A financial comparator was prepared as part of the Value for Money Assessment of the N8 Rathcormac to Fermoy Bypass Scheme, which identified the costs of procuring the scheme using a traditional procurement approach.

3.6. Preparation of the Financial Comparator

The Financial Comparator (FC) consists of an assessment of the total costs that would be incurred in the provision of a scheme through a traditional procurement scenario in which the public sector retains managerial responsibility and exposure to risk. In preparing the FC for the N8 Rathcormac to Fermoy Bypass Scheme, DOEHLG and UK Treasury guidance was used, as was the experience in preparing previous Financial Comparators by the NRA's specialist advisors i.e. technical (Babtie Group) and financial (KPMG).

The costs included in the FC were as follows:

- Base costs: the public sector's estimate of the costs it would incur to construct, maintain and manage the infrastructure to the duration and specification of the contract, before allowing for contingencies or risks.

- Retained risks: these risks, by their nature, always rest with the public sector;
- Risk retained under traditional procurement, but transferred under PPP: an allowance for the additional costs to the public sector as a consequence of the risks associated with the project.
- Efficiency adjustments: allows for the public sector improving its performance in managing base costs and the impact of risks over the life of the project.

The FC was prepared prior to the receipt of ITN Tenders, to ensure it represented the NRA's best estimate of the cost of delivering the services required under the PPP scheme without being influenced by knowledge of the private sector's actual proposals⁷.

3.7. Risk Assessment

In preparing the FC the risks capable of being quantified, that differed between the public and private sectors were assessed.

In deciding the risk adjustment to apply to the base costs comprising the FC, risk workshops were held over the period September 2001 - October 2003. The workshops were attended by key stakeholders including the NRA, their advisers, and the relevant Local Authorities.

A risk register was created, listing the principal causes of risk of relevance to the FC, and identifying the entity that would bear the risk under the FC and PPP procurement options. The workshops used the preliminary cost estimates as a starting point of discussion. Updated risk workshops were held to revisit the risk register.

Risks not amenable to quantification, but with the potential to influence the VFM assessment, were identified separately as part of the VFM assessment.

3.8. Identification of Non Monetary Costs and Benefits

Costs and benefits associated with each procurement option which were not amenable to quantification were also included in the VFM assessment. In order to identify the non-monetary costs and benefits associated with the PPP option, a separate workshop was held with the relevant stakeholders.

3.9. PPP Procurement Steps

Public Private Partnerships are a form of procurement and as such are subject to all the normal discipline applying to procurement generally, including Department of Finance procurement guidelines as well as EU Procurement Directives.

The procurement of the PPP Scheme was conducted in an open and transparent manner, and in line with the relevant EU and national regulations.

⁷ As "it was uncertain as to whether tolling would have received the same general broad acceptance if used with a traditional procurement" (Financial Comparator BAFO Update N8 Rathcormac/Fermoy Bypass December 2003 pg 1), two Financial Comparator scenarios were modelled, one with public sector tolling and one without tolling.

3.10. Summary

The planning steps implemented by the NRA prior to procuring the N8 Rathcormac to Fermoy Bypass Scheme as a PPP were reviewed in line with the official PPP implementation guidance. The relevant steps advocated in the guidance documents were implemented by the NRA.

As set out in Section 2, the steps above would have been enhanced by the completion of a revised economic appraisal at the tendering stage. This would ensure explicit consideration would be given to updated cost/traffic projections relating to the scheme. As noted in Section 2, a revised CBA at the tendering stage now forms part of the NRA's Project Appraisal Guidelines, which addresses this shortcoming for all current/future schemes.

4. PPP Procurement Review

4.1. Introduction

This section includes a review of the VFM assessment undertaken to determine if the basis on which the decision was taken to procure the scheme as a PPP was appropriate.

4.2. Outcome of VFM Assessment

The VFM Assessment compared, over the lifetime of the concession project (30 years), the Net Present Value (NPV) of the Exchequer cash flows associated with the traditional procurement scenario, with the NPV of the Exchequer cash flows associated with the PPP procurement scenario.

Table 4.1 sets out, in summary format, the NPV of the NRA and Exchequer costs and revenues associated with both procurement options *at BAFO* (as per the successful concessionaire).

Table 4.1: Summary of Exchequer Costs (including VAT*) of the scheme at BAFO (2003 Prices)

Financial Comparator (Traditional Procurement – with tolling)	NPV 000 €	PPP Option Preferred Tenderer	NPV 000 €
Base Costs	197,684	Construction payments	80,367
Toll Costs	69,833	Operational payments	39,627
Toll Revenue	(196,562)	Revenue Share	(1,415)
		Contract Mark-up	-
Project risks retained (costs)	52,776	Risks retained in PPP and FC	5,937
Less Revenue from lane occupation charges	-	Less Revenue from lane occupation charges	1,500
Total risk adjusted cost to NRA (before Revenue Risk)	123,731		
Project risks (Revenue)	48,305		
Total Risk adjusted cost to NRA	172,036*	Total Risk adjusted cost to NRA**	126,016*
Less incremental cash flows to the Exchequer	(46,909)	Less incremental cash flows to the Exchequer	(26,904)
Risk adjusted cost to Public Sector	125,127	Risk adjusted cost to Public Sector	99,112

Source: Financial Comparator BAFO Update N8 Rathcormac/Fermoy Bypass 2003

* Base cost estimates include capital, operations and lifecycle costs

As set out in the table, estimated costs of €126m associated with the PPP option, were below the estimated costs of €172m of traditional procurement⁸.

⁸ As previously indicated, owing to the uncertainty surrounding whether the motorway would be tolled in the event that the public sector undertook its construction and operation, a non-tolled Financial Comparator option was also modelled as part of the VFM Assessment. The non-tolled FC option represented a greater net cost to the NRA as no toll revenues were attributable to the Exchequer under this option. Owing to the fact that the differential between the Exchequer costs associated with the FC and PPP options was lower for the tolled FC scenario, the remainder of this Section is restricted to reviewing the tolled Financial Comparator scenario.

The higher estimated exchequer costs associated with the (tolled) FC option relative to the PPP option resulted in the decision being taken to procure the scheme as a PPP.

The cost and revenue items comprising the net NRA/Exchequer costs under the PPP scenario were not determined by the NRA; rather they resulted from the successful PPP Concessionaire bid, on the basis of their own estimates of the costs and toll revenues they would likely incur in providing the tolled infrastructure. The analysis below is thus restricted to reviewing whether the costs and revenues comprising the Financial Comparator were appropriate approximations of the costs and revenues attributable to the NRA under a traditional procurement scenario.

4.3. Review of Components of Financial Comparator

A detailed review was undertaken to determine if the individual cost and revenue items included in the Financial Comparator and PPP options represent accurate approximations of the costs and revenues attributable to the Exchequer under each procurement option. Full details of this review are included in Appendix B which can be summarised as follows:

- The whole life costs in the Financial Comparator was just 10% higher than those estimated by the average ITN Tenderers;
- The risk values associated with the FC scenario revealed that the cost risk values of €52.7m (20% of total costs) are broadly acceptable; and
- Toll revenue from the scheme under the traditional procurement scenario would likely total €140-€155m over the life of the concession, which is lower than the €196m estimated in the VFM assessment.

4.4. Summary

The NRA's decision to procure the N8 Rathcormac to Fermoy Bypass Scheme as a PPP was based on a VFM Assessment. The results of the VFM assessment showed there were higher NRA and exchequer costs associated with the Financial Comparator relative to the PPP option, which resulted in the decision being taken to procure the scheme as a PPP.

On the basis of the actual traffic volumes that have used the Bypass since its opening in late 2006, and likely future traffic growth rate scenarios (see Section 5.4), it is estimated that total toll revenues over the concession period, under a traditional procurement scenario, would give rise to circa €140 - €155 million (NPV), compared to the €196 million forecast as part of VFM assessment. This revised estimated level of toll revenue has the effect of increasing the estimated NRA cost associated with the scheme under the traditional procurement scenario.

5. PPP Scheme Implementation Review

5.1. Introduction

This section reviews the implementation of the N8 Rathcormac to Fermoy Bypass Scheme to date. The scheme's implementation is reviewed across three key criteria, as follows:

- **Timing:** A review of the time taken to complete the various stages of the scheme
- **Quality:** An analysis of whether the key elements of the scheme as per the project specification were achieved; and
- **Costs and Revenues/Traffic Volumes:** an analysis of the public sector costs associated with PPP Scheme relative to initial estimates.

5.2. Timing of PPP Scheme Implementation

As part of its 2000 Best Practice Guidelines, the Department of the Taoiseach (DOT) stated that a PPP approach should be adopted wherever it would “*accelerate the implementation of a particular project*”. In the Framework for Public Private Partnerships - Working Together for Quality Public Service, published by the Social Partners in 2000, the principles underpinning the PPP programme were set out, including: “*PPPs should maximise the benefits of private sector efficiency, expertise, flexibility and innovation*”.

Tables 5.1 and 5.2 set out the procurement and construction periods associated with the N8 Rathcormac to Fermoy Bypass Scheme.

Table 5.1: Procurement Timelines

Date	Task
Pre Qualification	
July 2001	Notice dispatched to OJEC
July 2001	OJEC Notice
ITN Tender Phase	
April 2002	Tender Invitation Documents issued
December 2002	Submission of Tenders for shortlisting
BAFO Tender Phase	
April 2003	BAFO Invitation
December 2003	Receipt of BAFO Submissions
June 2004	Contract Award
Road Opening	
October 2006	Road Opening

Source: NRA

Table 5.2: N8 Rathcormac to Fermoy Bypass PPP Scheme Timelines

	No of Months
Start procurement - end Procurement	35
Start Construction - end Construction	26
Start Procurement - end Construction	61

The procurement period, from date of first issue of the OJEC notice to contract award to the successful PPP bidder, totalled 35 months. A challenge on statutory procedures seeking a judicial review of the EIS caused a six month delay to the issuing of BAFO invitation documents. The PPP contract was awarded to the successful bidder in February 2004. The motorway Scheme was opened 19 months later, in September 2005,

It was not possible to identify equivalent procurement and construction timeframes for roads of a similar scale to the Fermoy scheme⁹. As such, the review of the scheme's timeliness is restricted to a review of the targets set for the scheme. The motorway scheme was scheduled to be complete in June 2007. The actual motorway opening took place in October 2006, 8 months ahead of schedule.

5.3. Quality of PPP Scheme Implementation

In reviewing the PPP Scheme's implementation, a number of key areas were reviewed:

- the delivery of the scheme to the specification of the PPP contract;
- the management procedures put in place by the NRA; and
- the contract management in the design, construction and operational phases.

5.3.1. Delivery of Key Element of the Scheme

The N8 Rathcormac to Fermoy Bypass was delivered in line with the contract specification. There have been no issues relating to the quality of the scheme post completion that have not been addressed speedily by the concessionaire, in line with the terms of the contract.

5.3.2. PPP Management by the NRA

The progression of the scheme was managed by a newly established PPP unit within the NRA. In line with published guidance, the NRA contracted legal, financial and technical advisers to assist with:

- the devising of an appropriate procurement mechanism;
- the drawing up of detailed contract documents; and
- assessing and selecting PPP consortia for the scheme.

To date, the management of the PPP Scheme contract has run smoothly. The PPP Concessionaire, in line with its obligations, has provided the NRA with its reporting requirements, including: Winter maintenance reports; Annual reports; Annual performance reports; five yearly management plans; and Monthly O&M reports.

5.3.3. Contract Management during Design and Construction

The NRA contracted technical engineers to project manage the design and construction of the scheme on its behalf¹⁰. Over the course of the construction period, the NRA was provided with a monthly construction period report.

⁹ Such a comparison would be possible if the schemes in the PPP pilot programme were compared to a sample of similar non PPP road schemes.

¹⁰ The contracted technical engineers were on site during the design and construction period, to oversee the technical design process and supervise construction activities. During this phase, weekly meetings were held between the NRA's technical engineers and their PPP concession company equivalents. In addition, monthly meetings were held which were attended by the PPP technical engineers, project contractors, the project supervisory team, NRA technical engineers, as well as the project liaison officer

5.3.4. *Contract Management during Operation*

The NRA's management of the operational phase of the PPP contract has operated on the same basis as the design and construction phase, namely technical support has been contracted in as required. NRA staff members are allocated supervisory roles for individual PPP Schemes. As part of this supervisory role, the NRA staff member is responsible for reviewing the reports provided by the PPP Concessionaire, making on-sites visits to the scheme and administering the contract.

5.4. **Outturn Cost of PPP Scheme**

One of the key principles underpinning the implementation of PPP infrastructure projects in Ireland is the obtaining of better Value for Money for the NRA and the Exchequer. The Department of Finance PPP Implementation guidance (see Appendix A) stated that Ex-Post Reviews of PPP Schemes should contain a comparison of the actual PPP outturn costs (as provided for in the PPP contract¹¹) with the initial estimated costs of the Scheme (as set out in the Financial Comparator).

The actual PPP outturn cost to the Exchequer is identified in the PPP contract and as such, the PPP outturn cost remains unchanged except where:

- any variation costs are potentially introduced after financial close; and/or
- the revenue share payable from the PPP Scheme are different to those estimated in the tender evaluation process.

There have been no variations to the Contract implemented since the awarding of the Bypass Contract in 2004.

In relation to Revenue Share, as part of the tender invitation process Tenderers were instructed to structure their bids such that Revenue Share would only be payable to the NRA where the aggregate traffic levels using the Scheme exceeded 21,000 AADT. The purpose of this stipulation was to ensure that the Tenderers would not put forward bids that would place the demand (toll revenue) risk associated with the Scheme back with the NRA/Exchequer.

The forecast revenue share payable under each PPP bid was estimated by calculating the revenue share payable under each of the low, medium, and high traffic forecast scenarios, and then assigning weights to the result revenue share totals on basis of 30%/60%/10% probabilities. Having compared the tendered bids in terms of their net cost to the NRA/Exchequer the winning bid resulted in a forecast €1.4 million (NPV 2003 Prices) revenue share being payable by the concessionaire to the NRA over the period of the Concession. Revenue Share as such represented just 1 per cent of the overall net NRA cost associated with a PPP procurement option of the scheme. Regardless of the traffic volumes that materialise on the scheme, the overall net cost to the NRA of the scheme will not differ by more than 1%. In this way, the NRA is protected from the financial consequences associated with any shortfalls in traffic using the scheme.

Notwithstanding this, for completeness, the level of traffic using the scheme vis a vis anticipated traffic forecasts are reviewed below.

¹¹ The actual costs incurred by the PPP Concessionaire in providing the infrastructure and services as per the specification incorporated into PPP contract is unknown, because the Concessionaire is not required to provide this information to the NRA. The outturn cost data that is available relates to the estimated outturn NRA costs associated with the PPP Contract, as signed by the Concessionaire at Financial Close. This cost estimate incorporates any agreed contributions to construction and operational costs payable by the NRA to the Concessionaire less any revenue share payable to the NRA.

5.4.1. Traffic Levels

Table 5.3 and Figure 5.1 below set out a comparison of the NRA traffic forecasts used as part of the VFM Assessment process and the actual traffic volumes which have materialised since the opening of the scheme in September 2005.

Table 5.3: Forecast NRA Weighted Average and Actual Traffic Volumes

Year	Low Forecast	Medium Forecast	High Forecast	Weighted Avg Forecasts	Actual Traffic	% difference (WA & actual)
2006	12,320	13,143	14,005	12,982	10,605	-18.3
2007	12,751	13,701	14,705	13,517	12,194	-9.8
2008	13,198	14,284	15,440	14,074	13,075	-7.1
2009	13,660	14,891	16,212	14,654	13,880	-5.3
2010	14,138	15,524	17,023	15,258	14,697	-3.7
2011	14,350	15,824	17,448	15,550	14,858	-4.5
2012	14,565	16,151	17,885	15,848	14,674	-7.4

Source: NRA

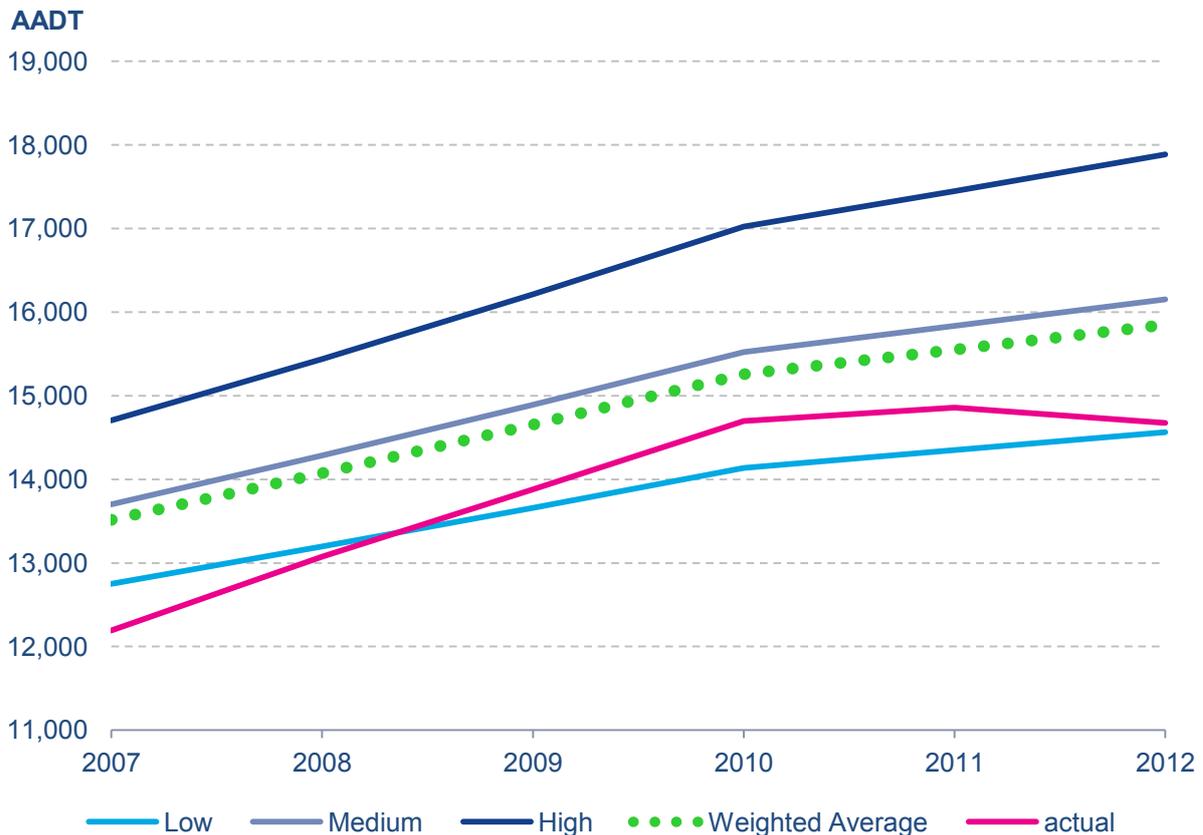


Figure 5.1: Forecast NRA and Actual Traffic Volumes (Source: NRA)

As Table 5.3 highlights, on aggregate traffic volumes annually have been below the weighted average traffic forecasts. The differential between forecast and actual traffic volumes decreased annually over the 2006 – 2010 period, with the differential totalling just 3.7% in 2010. The differential has since increased to reach 7.4% in 2012.

5.5. Summary

The N8 Rathcormac to Fermoy Bypass Scheme's implementation was reviewed in terms of the timing of the scheme, the quality achieved by the scheme and the actual materialised costs of the scheme against initial estimates.

The construction of the scheme commenced in June 2004 and completed in October 2006, 8 months ahead of Schedule.

A VFM assessment completed prior to the procurement of the Fermoy Bypass Scheme revealed better VFM associated with progressing the Scheme as a PPP, as the estimated NRA costs associated with the PPP options at €126m (NPV) were below the estimated equivalent NRA costs associated with the traditional procurement option (€172m NPV).

Since the signing of the PPP Contract with the concessionaire, the aggregate level of traffic using the scheme has been below the level forecast as part of VFM assessment. However, the net cost to the NRA of the PPP Scheme will not change relative to the cost forecast as part of VFM assessment, owing to the structure of the PPP Contract, and the stipulation made as part of tendering process that revenue share would only be payable where traffic volumes using the motorway would exceed 21,000 AADT. Regardless of the traffic that will materialise on the motorway over the concession period, the net cost to the NRA will not increase by more than 1% relative to the cost forecast

With the benefit of hindsight in relation to traffic volumes, it is of interest to review the decision to procure the Scheme as a PPP. The winning PPP Contract resulted in the state having to contribute €120 million (NPV) towards the capital and operational costs associated with the scheme. Owing to the revenue sharing arrangement put in place, regardless of the traffic demand that materialises over the period of the concession, the PPP outturn cost to the NRA will not increase substantially above the €126 million (NPV) forecast in the VFM Assessment.

On the basis of the actual level of traffic that has materialised, and its implications for the total toll revenue taken in a traditional procurement scenario, which increases the cost of the traditional procurement option, it is considered that the better Value for Money associated with the PPP procurement remains valid

6. Summary and Conclusions

The N8 Rathcormac to Fermoy Bypass was adequately planned both in terms of the statutory procedures, appraisal, routes selection and consultation and the planning undertaken in relation to the decision to procure the scheme as a Public Private Partnership (PPP).

The planning and implementation of the scheme could have been enhanced by:

- a cost-benefit at route selection stage;
- a revised economic appraisal at the tendering stage;
- a greater consideration of the risk associated with the materialisation of forecast demand for the scheme; and
- a sensitivity analysis of the costs of each procurement scenario to both the high and low traffic growth scenarios would provide a higher level of robustness behind procurement decision.

Cost benefit at both Route Selection (phase 2) and Tender / Contract Award (phase 5) now form part of the NRA's National Road Project Management Guidelines and the NRA Project Appraisal Guidelines for Cost Benefit Analysis.

The scheme has delivered on its objectives and the expected benefits and outcomes have materialised. The appraisal identified positive benefit / cost ratios ranging from 2.6 to 5.2. Since the opening of the scheme, traffic volumes along the route have been in the region of 15% below the forecast low growth scenario used in the appraisal. There has been a significant reduction in serious and fatal road collisions on the M8 / R639 corridor since the opening of the scheme.

The scheme is considered to have delivered value for money for the State, despite the reduced traffic volumes to date. The scheme has been open since 2006 and a national economic recession has contributed to a 4-5 year period of a general reduction in national traffic volumes. As the nation recovers from this difficult economic period, recent economic forecasts indicate a return to growth rates in line with forecasts used at the time of the scheme planning. Therefore the scheme is likely to deliver an economic return to the State in line with that forecast at the scheme planning stage.

During the implementation of the scheme, the appropriate management procedures adopted were satisfactory and in line with best practice guidance at the time. The implementation of the scheme as a PPP resulted in the scheme being delivered ahead of schedule and in line with the quality specified in the PPP contract.

A review of the materialised traffic volumes on the scheme and current traffic forecasting procedures determined that the PPP outturn cost will not differ substantially to the level forecast in the Value For Money Assessment. This is mainly due to the revenue share agreement put in place in the PPP contract which protected the NRA from the financial consequences associated with any shortfalls in traffic using the scheme. It is therefore considered that the decision to procure the scheme as a PPP represents value for money for the Exchequer.

Appendix A: Overview of PPP Guidance

Developing the Infrastructure Requirements of the National Development Plan: Best Practice Guidelines for Project Implementation, Department of the Taoiseach, 2000

As part of its 2000 Best Practice Guidelines, the Department of the Taoiseach (DOT) stated that a public private partnership approach should be adopted wherever it would accelerate the implementation of a particular project and represent better value for money over the full life cycle of the project. The DOT also stated that the most appropriate form of PPP (ranging from design and build to design, build, finance and operate) should be adopted having regard to the particular circumstances of the individual project.

Framework for Public Private Partnerships, Working together for Quality Public service. 2000

In 2000, a framework document endorsed by IBEC, ICTU, CIF, the Department of Finance and the Departments and Agencies engaged in the PPP process was published by the Social Partners. In the Framework a clear statements of the principles underpinning the PPP programme were set out, namely:

- PPPs should yield value for money for the Exchequer;
- PPPs should allocate risks to the party best able to control and manage them; and
- PPPs should maximise the benefits of private sector efficiency, expertise, flexibility and innovation.

A Policy Framework for Public Private Partnerships (PWC), DOEHLG 2000

In 2000, the then Department of Environment, Heritage and Local Government commissioned PWC to produce a framework within which PPP projects could be advanced in the roads, water and waste sectors. The resultant Policy Framework detailed policy guidance covering each stage in the development, implementation and management of PPP projects. Some of the key guidance points identified in the resulting policy framework document include:

- **Market soundings** should be undertaken to determine the level of interest among the private sector and the capability of the private sector market to undertake prospective PPP projects.
- An **Output Specification** should be prepared which defines the services required by the public sector which the private sector would be responsible for providing as part of a PPP project. The actual design of the works necessary to deliver that service would be left to the successful private sector tenderer.
- A key driver of the PPP programme is the desire to increase **Value for Money (VFM)** in infrastructure procurement. To ensure that value for money is achieved, the Contracting Authority should be able to demonstrate that the option selected offers better value for money than the alternatives. The VFM assessment should not be seen as a single step but one that is carried through the life of the project. An initial PPP Assessment should be completed at the Option Appraisal stage to determine the potential for a PPP to deliver improved value for money compared with a traditional procurement. The final VFM assessment can only be made at the conclusion of the procurement process.
- In the case of projects where the public sector is the sole or main purchaser, the VFM undertaken at the end of the procurement process should comprise two key elements:
 - Monetary comparison – a comparison of the cost of the preferred Public Private Partnership tender, with the cost of traditional public sector procurement (the Financial Comparator), expressed in terms of discounted cashflows over the life of the PPP contract; and

- Non-monetary comparison – a comparison of all the factors that are difficult to quantify in monetary terms, but their value to government and the wider public is significant. Examples include speed of project delivery, quality of service, and security of supply.
- One of the principles underlying PPPs is that risk should be allocated to the party best able to manage it. A detailed **risk assessment** should be undertaken for every PPP project.
- Central and Contracting Authorities will need to retain legal and financial advisers, as well as technical specialists, especially for Design, Build, Operate and Finance contracts and Concession contracts.

Policy Framework for Public Private Partnership (PPP) in Ireland: Project Implementation in the Local Government Sector, DOEHLG, Nov 2003

In 2003, the then Department of Environment, Heritage and Local Government published a policy framework document to guide the local government sector in the implementation of PPPs. The guidance highlighted the steps which all public projects must follow to ensure that the projects are properly examined and assessed, that the necessary statutory and administrative approvals are obtained, and that the procurement process is carried out in an efficient manner. It also highlighted the PPP specific tasks in relation to those steps, as follows:

- Project Identification – on the basis of an established business case/need for a project, the project receives the approval of a Sanctioning Authority. If a PPP approach is being considered some **market soundings** may be carried out to establish if there is market interest in the project.
- Option appraisal – during this phase various options for carrying out the project are examined, if the preferred option is a PPP, a PPP assessment report is completed which: determines the form the PPP will take; and establishes the **optimum allocation of risk** between public and private sector. Stakeholder consultation is carried out as part of a PPP Assessment Report. If the PPP procurement route is chosen, Department approval is sought before a Project Auditor is chosen, external advisors appointed, and a project steering group established.
- Statutory processes – the LA is responsible for preparing the project to go to procurement, including ensuring that the various planning and land acquisition and access consents are obtained.
- Pre-procurement - a **Public Service Benchmark (PSB)** cost is prepared, Departmental approval is sought for the project to go to procurement and an affordability cap is set based on the PSB.
- Procurement – the project is taken through the procurement process, when completed a tender recommendation report is submitted, and Departmental approval is sought to go to construction.
- Construction and operation – the contractor commences construction, variations may need to be referred to Department. When the LA is satisfied with the infrastructure provided, it signs off on the project and the operational contract commences.
- **Review of the PPP Process** – the performance of the project is reviewed
- Expiry of Contract

The Review of the PPP Process refers to the review of the performance of the project. As part of the policy framework document, the DOEHLG identified the objectives associated with the post project review of PPPs as follows:

- provide data on costs as an input to assessments (Public Sector Benchmarks) of subsequent PPP projects;
- provide public authorities with information on the economic benefits, or otherwise, of the PPP approach over alternative procurement approaches;
- identify the strengths and weaknesses in the systems in place for managing PPP projects.

It was noted that the Review of PPPs should contain the following:

- a brief description of the project;
- an outline of the project history with key decisions /events highlighted;
- a variance analysis of the final outturn costs of the project compared against initial estimates, the PSB, Affordability Cap and the Final Contract price;
- an analysis of the time taken to complete different stages of the project compared with projections; and
- the extraction of selected costs for the Department's database of costs on PPP projects.

Guidelines for the Provision of Infrastructure and Capital Investments through Public Private Partnerships: Procedures for the Assessment, Approval, Audit, and Procurement of Projects, 2006, Department of Finance

The Department of Finance (DOF) 2006 Guidelines for the Provision of Infrastructure and Capital Investments through Public Private Partnerships replaced Interim Guidelines published by the DOF in July 2003. The 2006 DOF Guidelines identified four distinct strands or functions associated with PPP projects as follows: the project appraisal function, the approval function, the procurement function and the audit function. Best practice would require an appropriate separation of functions between these strands.

1. The Sponsoring Agency is responsible for appraising projects. As part of the Detailed Appraisal, the Sponsoring Agency should determine the most appropriate procurement mechanism and, if a PPP approach is being considered, a PPP Procurement Assessment should be carried out.
2. Following appraisal of the proposed project, the Sponsoring Agency should approach the Sanctioning Authority for approval to proceed with the procurement of the project as a PPP.
3. PPP projects must be procured in line with all regulatory and EU procurement requirements in regard to tendering and bid evaluation.
4. There is a particular audit requirement in regard to PPP which is additional to the requirements outlined in the *Capital Appraisal Guidelines*, i.e. the appointment of a Process Auditor. A Process Auditor must be appointed for all PPP projects or grouped PPP projects where the capital cost is in excess of, or is likely to exceed, the limit specified by the Department of Finance (then €20 million).

Some of the key guidance points identified in the DOF 2006 Guidelines include:

- **Affordability:** A Sanctioning Authority should not allow a project to proceed unless it is satisfied that the overall capital cost of the project as a whole, including both PPP and non-PPP elements, can be accommodated within the Capital Envelope allocation(s) available to the Sponsoring Agency.
- **Value for Money:** VFM needs to be considered at two levels:
 - The overall VFM of the project – i.e. does the project as a whole offer good value for money; and
 - The VFM of the PPP contract – i.e. do the aspects of the project that are being procured by PPP represent good value for money, particularly when compared with the cost of achieving the same objective by traditional procurement (as represented by the Public Sector Benchmark (PSB)).

Four formal VFM tests should be carried out at the following points:

1. at PPP Procurement Assessment – a test carried out to determine whether, and in what form, a PPP arrangement has the potential to offer the best value for money solution for the procurement;
 2. at Completion of the Public Sector Benchmark (PSB) – to determine whether, in light of the quantifications in the PSB, the conclusion reached in the PPP Procurement Assessment still holds;
 3. at Tender Evaluation stage - to compare the highest ranking bid against the PSB, to assess whether the highest ranking bid offers a potential value for money solution; and
 4. at Financial Close – a final test carried out (a) to assess the impact of any changes in the interest rate and/or discount rate and (b) where the project has been procured using the Negotiated Procedure, to examine the effect of any proposed changes in the contract terms.
- The Sponsoring Agency should draw up a detailed **Output Specifications** for the project, focusing on outputs rather than inputs.
 - A **Public Sector Benchmark (PSB)** - a comprehensive estimate of the cost (including risk valuations) of procuring those elements of the project that the private sector is to be invited to tender for in the PPP contract - is derived from the Output Specifications. The final PSB cost should be expressed in Net Present Value (NPV) terms, thereby reflecting the time value of money. The Output Specifications and PSB should be finalised and should be up to date before any tender invitations are issued.
 - In any procurement competition, all of the tenders received are first examined to determine whether they are “suitable” bids. Having identified the highest ranking bid received, the next step is to examine the value for money of that bid.
 - As part of a **Post Project Review** a comparison of the actual outturn costs of the project (as provided for in the contract) with the initial estimated costs (as set out in the PSB) should be undertaken and recorded. A Post Project Review aims to draw lessons for the future and, therefore, any significant lessons learned from the review should be translated into changes in the Sponsoring Agency’s project practices. Each Sponsoring Agency should maintain a cost database which should be used when benchmarking costs for future projects and in the compilation of future Public Sector Benchmarks. The post project review exercise should be used to inform and update this database with the latest available information. In addition, each sector should maintain a sector-specific risk database.
 - In many instances, a PPP contract will include clauses that link payment to performance of specific obligations under the contract. In order to ensure that the full benefit is derived from these clauses, it is essential that the performance of the private sector partner is constantly monitored over the contract term and that these clauses are invoked, as appropriate.

Appendix B: Review of Components of Financial Comparator

As previously identified, the cost and revenue items comprising the net NRA costs under the PPP scenario were not determined by the NRA, rather they were determined by the PPP Concessionaire on the basis of the Concessionaire's own estimates of the costs and toll revenues they would likely incur in providing and maintaining the infrastructure. The analysis below is thus restricted to reviewing whether the costs and revenues comprising the Financial Comparator were reasonable approximations of the costs and revenues attributable to the NRA under a traditional procurement scenario.

There are three core elements comprising the net NRA costs associated with the traditional procurement (Financial Comparator) scenario. These are namely:

- overall construction, operational and lifecycle costs associated with constructing and operating the Scheme (including the road and tolling facility);
- values assigned to the risks (both cost and revenue) assumed by the NRA; and
- the revenue from tolls.

The assumptions used in the VFM assessment with respect to each of these components are reviewed in Sections B1 – B.3 below.

B1 Construction, O&M and Lifecycle Cost Estimates used in FC

The costs for each element as estimated in the original Financial Comparator (at ITN stage) are compared to the estimates provided by the four shortlisted ITN bidders in Tables B1 – B3 below.

Table B1: Construction Costs as per Pre-Tender Estimate and ITN bidders (2002 prices excl. VAT)

	Design (€000) ITN	Super- vision (€000) ITN	Prelims (€000) ITN	Works (€000) ITN	Tolling (€000) ITN	Other	Total
Non Risk adjusted Pre- tender estimate	1,923	6,864	10,496	99,673	9,570		166,667
Tender 1	██████	██████	██████	██████	██████	██████	196,857
Tender 2	██████	██████	██████	██████	██████	██████	133,609
Tender 3	██████	██████	██████	██████	██████		161,112
Tender 4	██████	██████	██████	██████	██████	██████	184,102

Source: N8 Rathcormac Bypass Technical Evaluation Report March 2003

On the basis of the data provided in Table B1, it is concluded that on aggregate, the construction costs estimates forming part of the Financial Comparator at ITN were good approximations of the estimated costs associated with these expenditure items.

Table B2: O&M Costs as per Pre-Tender Estimate and ITN bidders

	O&M 2006 (€000) ITN	O&M 2015 (€000) ITN
Non Risk adjusted Pre-tender estimate	2,829	3,249
Tender Average	2,973	3,524

Source: N8 Rathcormac Bypass Technical Evaluation Report March 2003

On average the O&M costs as bid by the Tenderers were similar to those estimated at ITN stage in the Financial Comparator.

Table B3: Lifecycle Costs as per Pre-Tender Estimate and ITN bidders

	(€000) ITN
Non risk adjusted pre-tender estimate	27,286
Risk adjusted pre-tender estimate	30,436
Tender Average	27,168
Tender 1	██████
Tender 1 (variant)	██████
Tender 2	██████
Tender 3	██████
Tender 4	██████

Source: N8 Rathcormac Bypass Technical Evaluation Report March 2003

The profile of life cycle costs is quite different for each tender, ranging from ██████ lower than the pre tender estimate to ██████ higher. However, on average the risk adjusted pre tender estimate was just 10% above the average tender estimate.

B2 Review of Risk Cost and Revenue Estimates in FC

Risk analysis formed an important element of the VFM assessment process. In determining the risk adjustments that needed to be applied to the base costs and revenues forming the Financial Comparator, risk workshops were held where key stakeholders gave consideration to *“how relevant risks had occurred in the past in the public sector and how they could be managed in the future, attempting to avoid optimistic bias in estimates”* (Financial Comparator BAFO Update N8 Rathcormac/Fermoy Bypass 2003, pg 17).¹²

Each of the quantifiable risks identified, were categorised according to whether they belonged to the following categories: project specific risks; planning risks; design risks; construction risks; operating risks; demand risks; financial risks; or legislative risks. Table B5 sets out the risks items identified in the risk

¹² As part of the risk analysis, the following process was adopted: Risk registers were prepared which identified, categorised and allocated the main project risks to either the NRA or the PPP Company depending on who would bear the risk under the FC or PPP procurement scenarios; The risks were prioritised and quantified through a series of risk workshops and reviews; The risks were modelled in order to calculate the expected financial impact of the risks over the concession period.

register, their allocation under the procurement type scenarios, as well as the value put on the risk during the risk workshops.

Cost Risk

As set out in Table B4, the major cost risks retained by the NRA under the traditional procurement FC scenario related to: construction risks, which totalled circa €29 million or 19% of the total base construction costs; and project specific risks which totalled €10.1 million or 7% of the total base project specific costs. The total cost risk value, which totalled €52.7m or 20% of the total estimated Scheme costs, is considered to represent a standard estimation of cost risks, given the history of cost overruns in previous road schemes.

In addition to cost risks, a value was also placed on demand risk, where demand risk 'is related to the uncertainty associated with the estimation of future traffic levels and therefore toll revenues' (Financial Comparator BAFO Update N8 Rathcormac/Fermoy Bypass 2003, pg 24). The demand risk associated with the Scheme was estimated to total €48.3 million, broken down as set out below.

Demand Risk

As part of the Financial Comparator, the forecast value of total Toll Revenue was estimated having recourse of the weighted average traffic forecasts, which were based on 30%/60%/10% probabilities being assigned to low/medium/high traffic growth scenarios respectively. Owing to the small difference between the low, medium and high traffic forecasts, and the probabilities used, the weighted average forecasts were not in effect very different to the medium/central traffic forecasts, (circa 1% difference in the first year of operation). Because the weighted average traffic forecasts did not differ substantially from the medium traffic, a relatively small value (not significantly different to the €4.5m (NPV) set out in Table 5.5 NPV) was attributed to this risk item. It would have been expected that the value of risk associated with 'user-charging' (i.e. failure to secure anticipated toll revenue) would have been greater than €4.5m (representing just 2.2% of total toll revenue) allocated to this risk item. In practice very little downside risk was assumed. Consideration of possible variability in demand suggests that the level of risk associated with 'user-charging' would be higher, given the nature of the proposed Scheme.

Conversely, the value of demand risk associated with external developments (i.e. the reduced tolls due to limited inflationary price increases) at €32m (representing 16% of total forecast toll revenue of €196m) appears high.

Table B4: Summary of Demand Risk Items (NPVs)

Risk Item	€m	%
External developments - reflects reduced toll revenues due to the risk of a delayed start of toll indexation and decreased level of toll indexation	32	66.3
Leakage of tolls – reflects reduced toll revenues on basis of risks of toll revenues being lost due to users not paying, users paying incorrectly, potential double use of tickets	10	20.7
User Charging – reflects failure to secure anticipated toll revenue because of lower levels of traffic volumes due to adverse economic circumstances; probabilities were assigned to low, medium and high traffic scenarios	4.5	9.3
Late Revenue Collection – reflects loss of toll revenue due to potentially late completion of construction and late start of toll collection	1.7	3.5
Total	48.3	

Source: Financial Comparator BAFO Update N8 Rathcormac/Fermoy Bypass 2003

Table B5: Overview of Cost Risks in Financial Comparator (NPV 2001 Prices)

Risk Category	Overview of Risk Type	Allocation of Risk	€000 (% of Relevant Base Costs)	Total Risks
Project specific	Risks predominately related to construction, including unforeseen archaeological sites, concerns relating to the railway bridge works, and potential shortage of imported material	FC – all retained by NRA PPP – all transferred to PPP Co	10,100 (6% of base construction costs)	
Planning	Risks relating predominately to obtaining scheme approval	FC – retained by NRA PPP – all transferred to PPP Co apart from statutory approvals which is retained by NRA	26	
Design	Risks related to the Scheme design including the potential for design drift and additional design costs as more detailed information becomes available	FC – retained by NRA PPP – all transferred to PPP Co	4,900 (3% of base construction costs)	
Construction	Risks relating to construction including: variations (7.2m), ground works (5.6m), estimating errors (5.0m), structures (2m), drainage (€1.7m), construction inflation (€0.3m)	FC – all retained by NRA PPP – all transferred to PPP Co	29,400 (19% of base construction costs)	
O&M	Risks relating to operation and maintenance include the risks of estimation errors (€3.3m), service non availability (€1.4m), inflation (€1.4m), third party claims (€1.4m)	FC – all retained by NRA PPP – all transferred to PPP Co	4,300 (15% of base operating costs)	
Lifecycle	Risks relating to a poorer than expected performance of key construction elements and/or materials	FC – all retained by NRA PPP – all transferred to PPP Co	940 (8% of base lifecycle costs)	
Tolling	Risks relating to operating and lifecycle costs	FC – all retained by NRA PPP – all transferred to PPP Co	3,200 (5% of base tolling related costs)	
Financial	Risks relating to variables including interest rates and other cost of finance fluctuations, as well as insurance costs	Majority transferred to PPP Co in each scenario	(22)	
Legislative	Risks relating to legislation		-	
Total Cost Risk				52,800
Demand	Risks relating to the uncertainty associated with the estimation of future traffic levels and ultimately toll revenues. Total demand risk is comprised of reduced revenue due to limited inflation (71m); leakage of tolls (17.6m); user charging (2m) and late revenue collection (7m).	FC – all retained by NRA PPP – shared with the PPP Co in line with Revenue Share agreement - with exception of leakage of tolls which is fully transferred to PPP Co	48,300 (25% of total tolling revenues)	
Total Revenue/Demand Risk				48,300

Source: Financial Comparator BAFO Update N8 Rathcormac/Fermoy Bypass 2003

B3 Review of Toll Revenues in Financial Comparator

The key determinants of the estimated NRA toll revenues in the FC scenario were the forecast traffic volumes using the new motorway infrastructure.

Traffic Volumes

The revenue attributable to the NRA (in the case of the FC - where all toll revenue would be attributable to the NRA), was estimated in the VFM Assessment process using weighted average traffic forecasts, which was based on 30%/60%/10% probabilities being assigned to low/medium/high traffic growth scenarios respectively

As set out in Section 5.4 since the year of opening aggregate traffic levels using the bypass have not reached the weighted average forecast, as per the traffic forecasts which were used as part of the VFM assessment process. The level of car usage has exceeded the levels forecast, while the level of usage by goods vehicles has been below the level forecast. This is partly explained by the economic recession which took hold in 2007/2008.

A review of total toll revenue that would have accrued to the State under a traditional procurement scenario, on the basis of the traffic levels that have materialised to date, and estimated future traffic growth scenarios based on traffic forecast guidance in place, gives rise to a total toll revenue value of circa €140 - €155m (NPV), which is lower than the €196 million (NPV) forecast as part of the VFM assessment

Appendix C: Technical Note on Public Sector Benchmark

The following is an extract from the Technical Note on the compilation of a Public Sector Benchmark for a Public Private Partnership Project published by the Department of Public Expenditure and Reform which outlines current policy relating to disclosure of the Public Sector Benchmark.

“1.15 Disclosure of the Public Sector Benchmark

Current policy is that the PSB, or any elements thereof, is / are not made public during the tendering process on the basis that revealing the amount that the State is willing to pay may give tenderers an opportunity to increase their asking price above what they might otherwise seek. Where the public sector is likely to procure a similar project in the same or other sectors in the foreseeable future, the PSB (or any elements thereof) should not be released, even after the completion of the tendering process.

In the case of a once-off project, where it is not likely that there will be any similar procurement in the future, the release of the PSB after the contract has been signed could be considered, subject to the non-disclosure of risk valuations (see below). However, before releasing any of the PSB documentation, the Sponsoring Agency must be satisfied that none of the information being released could diminish the potential to secure value for money bids when procuring future projects.

If the Sponsoring Agency is satisfied that it is in order to disclose the PSB, it must advise the Sanctioning Authority of its intention to do so and of the basis for disclosure.

In no circumstances should the individual risk valuations set out in a PSB be disclosed and no information should be released in a format that would permit the identification of risk values. To do so would provide information on how the public sector values risk, which would prejudice the ability of the public sector to secure value for money in current and future projects through risk transfer. Similarly, it is important to ensure that information relating to the demand projections used in the development of a PSB for a Concession project (e.g., the Sponsoring Agency’s traffic forecasts for a toll road) is not disclosed.

Disclosure of any aspect of the PSB could have an adverse effect on the conduct by the Sponsoring Agency of PPP contract negotiations, particularly as information contained in the PSB could disclose positions taken in past or current negotiations and, indeed, positions that may be taken in future negotiations. Disclosure of the PSB, or elements thereof, may also give rise to an unwarranted loss to the Sponsoring Agency and/or an unwarranted gain to the private sector as access may be given to financial, commercial, industrial, scientific or technical information that belongs to the Sponsoring Agency.

The PSB, like other confidential and similar information relating to projects, is of course available to the Comptroller and Auditor General for inspection in connection with any reports his / her office may be progressing.”

Limerick Tunnel PPP Scheme

Post Project Review



Important Notice

This report has been prepared by AECOM Limited. It is based on information and explanations provided by the National Roads Authority and has been prepared for the sole use of the National Roads Authority.

This Post Project Review report contains certain information of a commercially sensitive nature and should be kept confidential. This report contains information relating to tenderer's pricing and contains information on the Public Sector Benchmark. The PPP Guidelines (Technical Note on the compilation of a Public Sector Benchmark for a Public Private Partnership Project¹) published by the Department of Public Expenditure and Reform require public bodies to keep information relating to the Public Sector Benchmark confidential. This PPR report contains information relevant to the State's approach to evaluation of value for money in PPP competitions that the State may adopt in its future PPP competitions. Release of certain information contained in the Post Project Review report, whether on foot of freedom of information request or otherwise, would likely impact negatively on the State's commercial interests and would accordingly, not be in the public interest. In the event that the recipient receives any request to disclose any information contained in the Post Project Review report (whether pursuant to freedom of information legislation or otherwise), we would ask you to notify the National Roads Authority of this request prior to any disclosure being made so that our comments may be taken into account in any decision that might be taken in this regard.

¹ Appendix C contains an extract from the Technical Note on the compilation of a Public Sector Benchmark for a Public Private Partnership Project which outlines current policy relating to disclosure of the Public Sector Benchmark.

Limerick Tunnel PPP Scheme

Post Project Review

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Executive Summary

The Limerick Tunnel PPP Scheme involves the provision of 10 km of two-lane dual carriageway, 2 km of single-lane dual carriageway, 4 grade separated junctions, an immersed tube tunnel under the river Shannon, 11 bridges and 2 toll plazas.

Procurement of the Limerick Tunnel PPP Scheme was via a Public Private Partnership (PPP) arrangement. The procurement process commenced with pre-qualification in April 2004 with the contract awarded in August 2006. The scheme opened in July 2010 two months ahead of schedule.

Since the opening of the Limerick Tunnel PPP Scheme, large volumes of traffic have used the dual carriageway, and it has contributed to a reduction in the volumes of traffic in Limerick city-centre.

However, the traffic volumes using the scheme to date are circa 47% below the levels used in the economic appraisal and 53% below the levels used in the value for money assessment.

Despite the significant shortfall in traffic volumes from the level forecast, an updated economic evaluation (carried out in January 2015) forecasts a large positive economic return with a BCR of 3.3.

Based on the results of this evaluation and the scheme largely achieving its key objectives, the decision to develop the scheme is considered validated.

The decision to procure the scheme via PPP was also examined. Following a detailed review of the components of the value for money assessment, it was determined that the net cost of both traditional procurement and the PPP option used were potentially underestimated. This is due to the significantly lower levels of traffic realised on the scheme once built.

The impact of reduced traffic levels is a decrease in the potential revenue share payable by the PPP Concessionaire to the NRA and the activation of the contract provision for traffic guarantee payments to be made from the NRA to the PPP Concessionaire. Had the scheme been procured by traditional procurement (design & build) the reduced traffic volumes would also have led to a substantial reduction in the toll revenue received by the NRA. The net effect of these changes is a reduction in the relative benefit of the PPP procurement option compared to the traditional procurement option.

Notwithstanding the lower outturn traffic the PPP option remains the lower cost option and therefore the decision to procure the scheme as a PPP represented value for money for the Exchequer and is considered the appropriate form of procurement for the scheme.

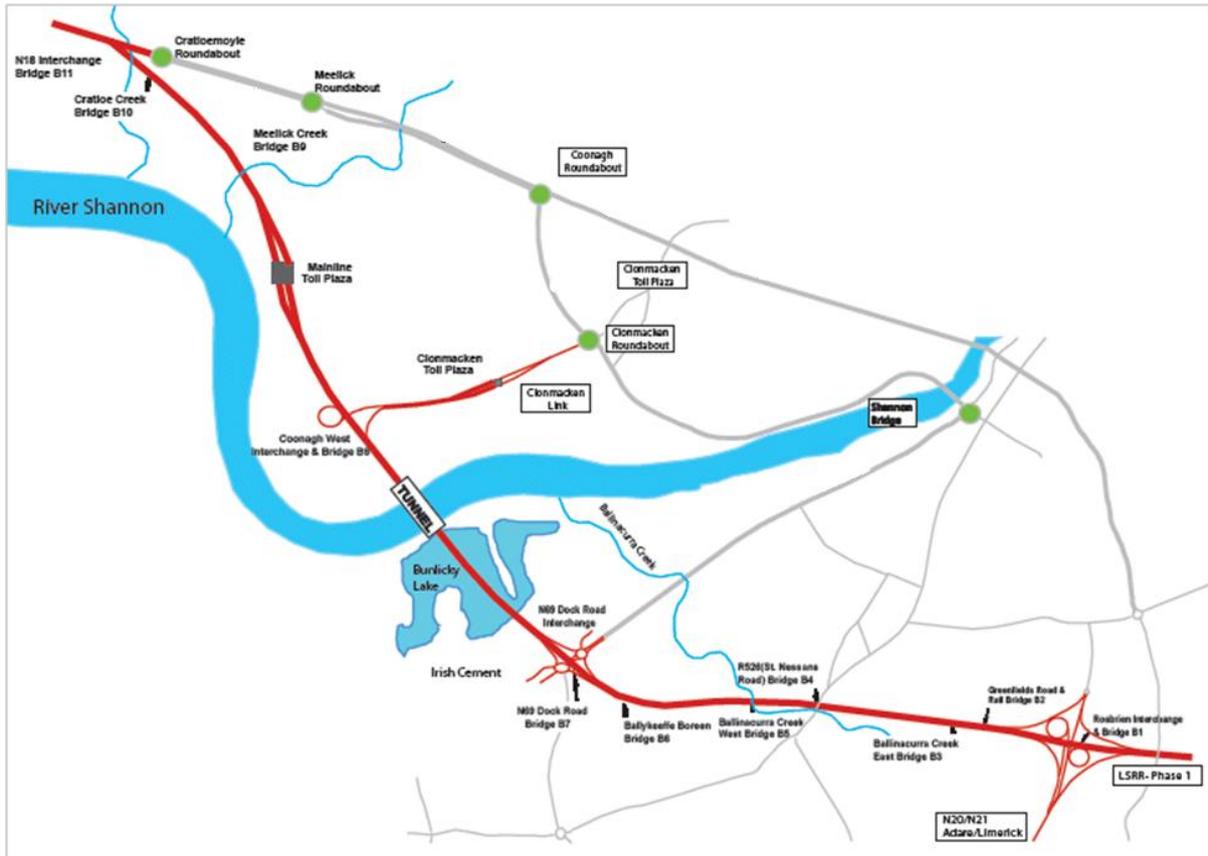
1 Introduction

1.1 The Scheme

The Limerick Tunnel PPP Scheme² involves the provision of 10 km of two-lane dual carriageway, 2 km of single-lane dual carriageway, 4 grade separated junctions, an immersed tube tunnel under the river Shannon, 11 bridges and 2 toll plazas.

The scheme covers the route of the N18 from the Limerick Southern Ring Road Phase 1 and the M20 Cork/Tralee Road in the area of Rossbrien to the N18 Ennis Road near Cratloe.

Figure 1.1 – Map of Limerick Tunnel PPP Scheme



Procured as a Public Private Partnership (PPP) project, the Contract was awarded to the Direct Route Consortium³ in August 2006, and will extend for 35 years from that date. In July 2010 the scheme was opened. Built as part of a Concession PPP Scheme, users of the tunnel section of the dual carriageway are tolled in accordance with the Toll Byelaws developed for the scheme.

Tolls are collected at two toll plazas – one located on the mainline dual carriageway and a second on the Clonmadden link road. The Clonmadden link road provides access to the southerly section of the scheme (i.e. the N18 tunnel). There is no access from the Clonmadden link road to or from the northerly section of the scheme. Therefore any road users who use the tunnelled section of the

² The Limerick Tunnel PPP Scheme was also originally promoted as the Limerick Southern Ring Road Phase 2 during the Statutory approvals process.

³ The Direct Route Consortium sponsors consisted of Strabag AG, John Sisk & Son (Holdings) Limited, Lagan Holdings Limited and Roadbridge Limited.

scheme are subject to a toll. Road users of the section between the N69 Dock Road and N20/21 Rossbrien junction are not subject to a toll.

This report comprises a Post Project Review of the Limerick Tunnel PPP Scheme.

1.2 Guidelines for Post-Project Review

Post Project Reviews are typically carried out a few years after the opening of a scheme. This allows the reviewer to make an initial assessment of the performance of the scheme.

The current standards for Post Project Reviews (PPR) of capital infrastructure projects are those set out in the *'Public Spending Code'* first published by the Department of Public Expenditure and Reform (DPER) in 2011. This Code specifies that the aim of such a PPR is to determine whether:

- The basis on which a project was undertaken proved correct;
- The expected benefits and outcomes materialised;
- The planned outcomes were the appropriate responses to actual public needs;
- The appraisal and management procedures adopted were satisfactory; and,
- Whether conclusions can be drawn which are applicable to other projects, to the ongoing use of assets, or to associated policies.

Since the early 2000s successive guidance documents have been published by various Government departments which set out the recommended steps that should be undertaken when implementing PPP projects in Ireland to ensure better value for money for the exchequer.

The available guidance at the time the Limerick Tunnel PPP Scheme was being developed includes interim guidelines published by the Department of Finance⁴ and a policy framework by the Department of Environment Heritage and Local Government⁵. Both of these were published in 2003 at which point planning for the Limerick Tunnel PPP Scheme was well advanced⁶. An overview of PPP guidance is provided in Appendix A.

The PPP guidance that was in place at the time the Limerick Tunnel PPP Scheme was being planned was not as comprehensive as the most recent guidelines.

The available guidance allowed the identification of some of the key areas that should be covered when completing Post Project Reviews of PPP Schemes, including

- Reviewing the PPP planning steps;
- Reviewing the PPP procurement decision; and
- Reviewing the PPP scheme implementation.

Similarly the NRA's project appraisal guidance has evolved through the years with the NRA's Project Appraisal Guidelines (first published in 2008⁷) determining the current recommended process to be followed.

On the basis of the overview of the guidance above, a two part approach to this Post Project Review was adopted. In the first instance, a value for money review of the scheme itself was undertaken, identifying the established project need, whether the project design process was properly planned, and whether the project is delivering benefits in excess of costs.

⁴ Interim Guidelines for the Provision of Infrastructure and Capital Investments through Public Private Partnerships – Department of Finance, July 2003

⁵ Policy Framework for Public Private Partnership (PPP) in Ireland – Department of the Environment Heritage and Local Government, November 2003. Note: Appendix 1 of the framework document provides a detail of the key documents in the PPP area prior to 2003

⁶ The project commenced in November 1999, the preferred route corridor was selected in September 2001 and the preliminary design report was published in September 2003.

⁷ The Project Appraisal Guidelines were first published in 2008 and have developed incrementally from that point

The second part of this Post Project Review (PPR) comprises a value for money review of the decision to procure the scheme as a PPP. This includes a review of the PPP pre-planning steps undertaken, a review of the PPP procurement decision, and a review of the PPP scheme implementation to date in terms of expected outcomes.

1.3 Layout of the Report

The broad structure of PPR is as follows: Section 2 outlines a traditional Post Project Review of the Limerick Tunnel PPP Scheme as a project. This is in line with the NRA *Project Appraisal Guidelines* (PAG), the DPER *Public Spending Code* and the Department of Transport's '*Guidelines on a Common Appraisal Framework for Transport Projects and Programmes*', 2009.

Sections 3-5 focus on a review of the procurement of the scheme as a Public Private Partnership (PPP). Section 3 reviews the pre planning steps carried out by the NRA prior to procuring the scheme as a PPP. Section 4 reviews the basis of the decision to procure the scheme as a PPP, while Section 5 is concerned with the PPP project outturn relative to the outturn anticipated. Finally Section 6 presents a summary of the PPR findings and recommendations.

2 Scheme Review

2.1 Introduction

As identified in Section 1, the *'Public Spending Code'* identifies a number of questions that need to be answered as part of a Post Project Review of a scheme. The approach taken here to address the requirements of the Code is to identify key stages in the scheme development and the key questions regarding each stage that address the requirements set out in the Code, as follows⁸:

- Scheme Conception
- Scheme Planning
- Scheme Implementation
- Scheme Operational Performance

2.2 Scheme Conception

2.2.1 Background

The Limerick Tunnel PPP Scheme was procured as a Public Private Partnership incorporating the design and construction of 10 km of two-lane dual carriageway, 2 km of single-lane dual carriageway, 4 grade separated junctions, an immersed tube tunnel under the river Shannon, 11 bridges and 2 toll plazas.

The Limerick Tunnel PPP Scheme is an important element of the national road network, completing the bypass of Limerick City that links all of the national routes that converge on the city. The scheme provides an additional Shannon river crossing in the environs of Limerick City and the only one not in the city-centre.

The majority of national routes that converge on Limerick City do so south of the river Shannon – namely the M7 from Dublin, N24 from Waterford, N20 from Cork/Tralee and N69 from Foynes. The N18 from Galway is the only national route north of the river Shannon.

In order to travel to or from the N18 to any of the other national routes, road users would cross one of the Shannon bridges in the centre of Limerick City. Not only was this impacting journey time but it also led to considerable congestion in Limerick City.

The scheme was developed as a PPP scheme on the basis that a PPP could deliver

- (i) value for money when compared to traditional procurement;
- (ii) facilitate the injection of private finance and accelerate the delivery of the national road improvement schemes to reduce Ireland's infrastructural deficit; and
- (iii) ensure a high quality route that would offer a greatly improved service for users of the then existing N18 and relieve congestion in Limerick City.

The Contract to construct the scheme was awarded in August 2006 and the scheme opened in July 2010.

2.2.2 Need and Objectives

The need for Limerick Tunnel PPP Scheme was identified in a number of national policy documents, namely:

- The National Road Needs Study 1998
- The National Spatial Strategy 2000 – 2020
- The National Development Plan 2000 – 2006

⁸ A more detailed summary of the relevant stages and key questions are set out in Appendix A.

- Limerick County (now Limerick City and County Council) Development Plan 1999 – 2004
- Limerick Corporation (subsequently Limerick City Council and now Limerick City and County Council) Development Plan 1998
- Clare County Development Plan 1999 – 2004

The National Roads Needs Study identified the Limerick Southern Ring Road as an important requirement to relieve traffic congestion in Limerick City and environs. The study also noted the need for an additional crossing of the River Shannon on the Western side of the city was being kept under review. The Limerick Tunnel PPP Scheme incorporates the second phase of the Limerick Southern Ring Road (as then envisaged) and the additional crossing of the Shannon.

The National Spatial Strategy recognised Limerick as a Gateway. As a Gateway, Limerick was projected to support balanced regional development. The Limerick Tunnel PPP Scheme provides improved access to Shannon Airport and the ports on the Shannon Estuary. The scheme also forms part of the road corridor from Cork to Letterkenny. As such, the scheme was identified as supporting the objectives of the National Spatial Strategy and Limerick's Gateway status.

The National Development Plan 2000 – 2006 identified the Western Corridor from Sligo through Limerick to Rosslare (N17, N18, N24 and N25) as a series of national primary routes requiring major improvements. The Limerick Tunnel PPP Scheme forms part of this corridor.

The Limerick County Development Plan identified the Limerick Tunnel PPP Scheme as being of fundamental importance to the county. The Plan included as an objective progressing the design of the scheme, reserving land for and commencing construction of the Limerick Tunnel PPP Scheme subject to availability of funding.

The Limerick Corporation Development Plan also included the Limerick Tunnel PPP Scheme as an objective.

The Clare County Development Plan included the continuation of the upgrading of the N18 including the design and reservation of land for and construction of the Limerick Tunnel PPP Scheme.

2.3 Scheme Planning

2.3.1 Current NRA Project Management and Appraisal Guidance

The present day guidelines were not in place at the time the Limerick Tunnel PPP Scheme was being developed. Indeed, the experience of this and other similar schemes is likely to have been an input to the development of the current guidelines. Nonetheless it is useful to examine the present day guidance.

As part of the NRA's current Project Management Guidelines (2010) and Project Appraisal Guidelines (2008 onwards) there are a number of recommended steps involved in the planning of a new road development. These are summarised in Table 2.1.

Table 2.1 – Summary of Key Deliverables as per Current Guidance

Phase	Project Management Guidelines Deliverables	Project Appraisal Guidelines Deliverables
2 – Route Selection	Public Consultations Route Selection Report Variation to County Development Plan Public display (preferred route)	Traffic Modelling Report Cost Benefit Analysis Updated Project Brief Preliminary Business Case Project Appraisal Balance Sheet
3 - Design	Design Report	Revised Traffic Modelling Report CBA (using Target Cost and Total Scheme Budget)
4 – Statutory Processes	EIS/CPO documents	Revised Traffic Modelling Report CBA (using Target Cost and Total Scheme Budget) Updated Project Brief Revised Project Appraisal Balance Sheet Business Case
5 – Tender & award	Tender Documents Tender Report	Updated Traffic Modelling Report Updated Cost Benefit Analysis Updated Project Brief Updated Project Appraisal Balance Sheet Final Business Case

Source: NRA Project Management Guidelines 2010

2.3.2 Guidance in Place at Scheme Preliminary Design Stage

Both the 2010 Project Management Guidelines and the 2008 Project Appraisal Guidance were put in place by the NRA post the awarding of the contract for this scheme. Some elements of the scheme also pre-dated the NRA's 2000 Project Management Guidelines and the DOT 2004 published '*Parameter Values for Use in Cost-Benefit Analysis of Transport Projects*'.

The main source of appraisal guidance in place at the time of the implementation of the scheme was the UK Design Manual for Roads and Bridges (DMRB) and the UK Treasury Taskforce policy statements and technical notes⁹. In addition, the National Roads Needs Study (1998), included forecast traffic growth on the national road network in Ireland over the period to 2019.

2.3.3 Traffic Analysis and Forecasting

Colin Buchanan and Partners were commissioned in July 1999 by MCOS-COWI Joint Venture to undertake traffic modelling of Limerick and its immediate vicinity in order to test proposals for new road alignments and a new river crossing of the Shannon.

A 1997 observed traffic model of Limerick existed at this time. The model, built for Limerick Planning and Land use Study (PLUTS) covered the Limerick City area. This model needed to be extended in order to include the new roads being proposed.

A computerised traffic simulation model (SATURN) was prepared by Colin Buchanan and Partners representing existing conditions on the road network, and modelling the effects of the Limerick Tunnel PPP Scheme proposal.

A series of traffic counts were undertaken in January 2000 to provide further calibration and identify local trips and background trip volumes on peripheral roads.

A series of alignment and crossing options were identified and tested within the traffic model. The options were developed iteratively with further model testing prompting further refinements in the design.

⁹ UK Treasury Taskforce "Policy Statement No. 2 – Public Sector Comparators and Value for Money" and "Technical Note No. 5 – How to Prepare a Public Sector Comparator"

The initial study was published in June 2001 and the final version in July 2002. The traffic study included a study of the impact of tolling on the scheme.

The traffic figures provided in Table 2.2 below show the traffic forecasts for the tolled option.

Table 2.2 – Forecast Daily Traffic Flows on Limerick Tunnel PPP Scheme (Tolled)

Location	AADT		
	2008	2028	Annual Growth
N18 (North of Junction with old N18)	35,493	44,103	1.1%
Tunnel (Tolled)	27,124	40,651	2.0%
N18 (N69 to M20)	18,299	51,201	5.3%
M20 (South of M7)	16,946	32,695	3.3%
M7 (N24 to M20)	18,933	29,277	2.2%

Source: Traffic Report – Limerick Southern Ring Road Phase II (Colin Buchanan & Partners, July 2002)

An examination of the impact of tolling shows circa 21% reduction in traffic flows in 2008 if tolling is in place on the scheme. This decreases over the period examined in the traffic model to a reduction of 16% in 2028.

Table 2.3 – Forecast Daily River Crossings on Limerick Tunnel PPP Scheme

Location	AADT	
	2008	2028
Tolled	27,124	40,651
Not Tolled	34,492	48,196
Diversion	21%	16%

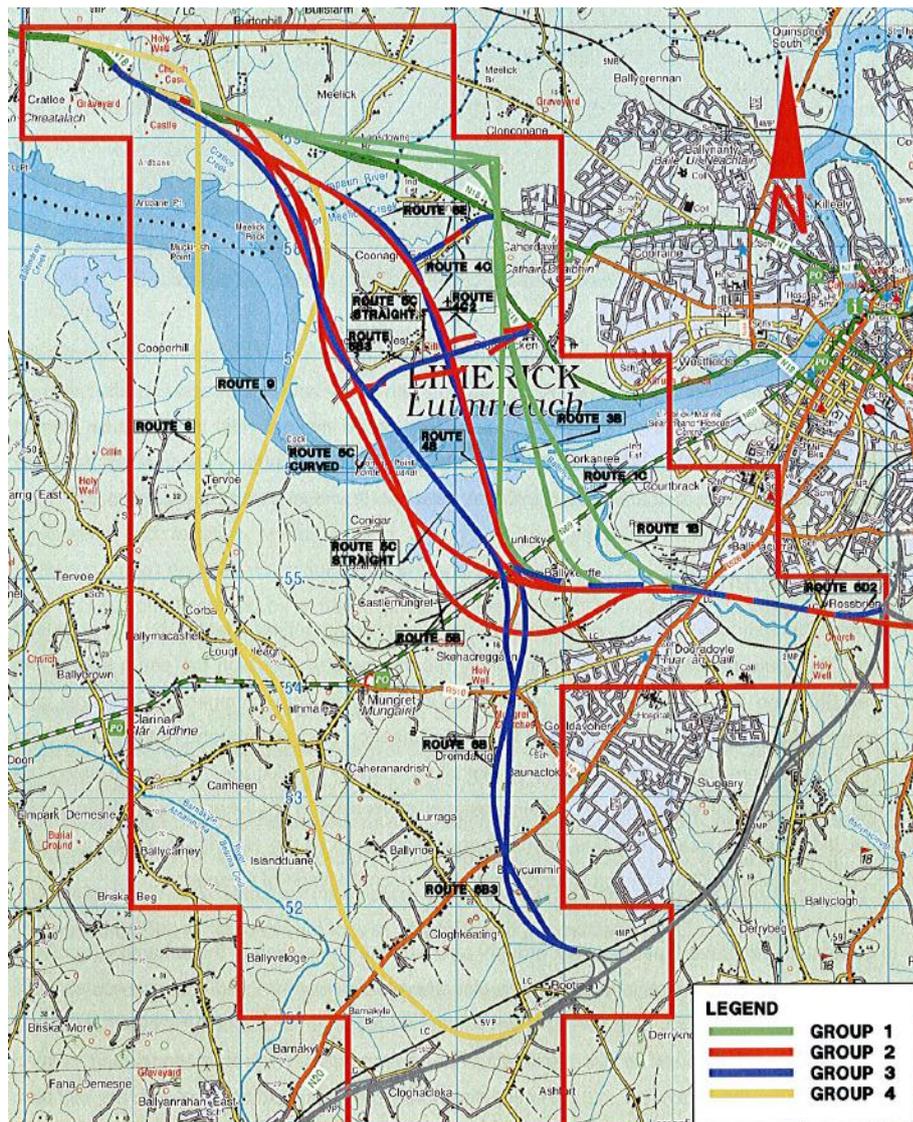
Source: Traffic Report – Limerick Southern Ring Road Phase II (Colin Buchanan & Partners, July 2002)

2.3.4 Route Selection and Preliminary Design

A range of route options were studied for the Limerick Tunnel PPP Scheme. They were grouped into four main categories.

- Group 1 (Green) consisted of three options commencing at Rossbrien Interchange, proceeding west via Ballinacurra/Ballykeeffe, with the Shannon Crossing in the Ballinacurra Creek/Bunlicky area, continuing north to the N18 via Clonmacken and Coonagh Roundabouts;
- Group 2 (Red) consisted of seven options commencing at Rossbrien Interchange, proceeding west via Ballinacurra/Ballykeeffe, with the Shannon Crossing in the Ballinacurra Creek/Bunlicky area, continuing north to the N18 near Cratloe, by various routes east and west of Coonagh Village;
- Group 3 (Blue) consisted of five options based on connection to the existing network at the Rossbrien Interchange and near Rootiagh, routed to the Dock Road (N69), then extending north across the Shannon to the N18; and
- Group 4 (Yellow) consisted of two outer options beginning south at the Interchange near Rootiagh on the N20 and passing to the west of the Irish Cement Plant at Mungret before crossing the river west of Coonagh Village to join the N18 near Cratloe Castle.

Figure 2.1 – Route Options



Based on the results of the traffic analysis carried out on the options identified, two viable alternatives were identified. These were both in the Group 2 (Red) range of options with one route to the east of Coonagh and the other to the west.

A multi-criteria assessment of the alternative options was carried out under the following categories:

- Environmental;
- Engineering; and
- Economic.

The analysis showed that both routes were comparable when assessed against the relevant criteria. The minimisation of environmental impact was prioritised leading to the option passing to the west of Coonagh being preferred.

A project appraisal on the Limerick Tunnel PPP Scheme was carried subsequent to route selection.

2.3.5 Project Appraisal

A Cost Benefit Analysis (CBA) study was undertaken by Colin Buchanan and Partners in 2004.

The analysis was undertaken using the computer cost analysis programme Cost Benefit Appraisal (COBA) developed by the Transport Research Laboratory (TRL) in the UK.

The output of the traffic model (discussed above) was used in the economic evaluation. This included the forecast Annual Average Daily Traffic (AADT) for each section of road between junctions. The traffic figures used were based on the construction of the Limerick Tunnel PPP Scheme with the inclusion of a toll.

The scheme was assumed to open in 2008 and have a design life of 20 years. A present value year of 1999 was used.

The estimated cost of the scheme at 2002 prices was €341 million, excluding VAT (including the costs associated with construction, land, property and design). The costs of the scheme were compared to the forecast benefits which included time savings, vehicle operating costs and accident savings. The results of the economic evaluation identified a Net Present Value of €933 million. It should be noted that as tolls constitute both a cost to the road user and a benefit to the provider of the road, the level of tolls has no net impact on the economic appraisal of the project.

The results of the evaluation are shown in Table 2.4. The Internal Rate of Return (IRR) was forecast to be 24% and a Benefit to Cost Ratio (BCR) of 4.7. These results provided a very strong business case for the project.

Table 2.4 – Results of Economic Evaluation (1999 prices & values)

Description	Amount
Present Value of Benefits €m	1,183
Present Value of Costs €m	250
Net Present Value €m	933
IRR %	24%
Benefit to Cost Ratio (BCR)	4.7

Source: Shannon Crossing Phase II COBA Analysis (Colin Buchanan & Partners, 2004)

There was no sensitivity analysis carried out on ranges of demand and cost. In addition, the economic appraisal of the scheme was not re-visited at tendering stage, when revised costs estimates and up to date traffic forecasts associated with the scheme were available.

2.3.6 Compliance with Procurement, EIS and other Statutory Requirements

An Environmental Impact Statement (EIS) was prepared for the Limerick Tunnel PPP Scheme in October 2003.

Procurement of the Limerick Tunnel PPP Scheme was via a Public Private Partnership (PPP) arrangement advertised in the OJEU in April 2004. The preferred tender was selected in September 2005 and the contract signed in August 2006.

All of the above processes satisfied the statutory procedures in place at the time.

2.3.7 Adequacy of Consultation Processes

The public were invited to take part in a number of consultation sessions. The consultations were advertised in the local and national press, on radio, display of notices in public venues and delivery of leaflets to households.

Following the selection of the Preferred Route, individual consultations took place with landowners directly impacted by the scheme. The design of the scheme was influenced by concerns raised by affected landowners.

The public were invited to make written submissions in relation to the contents of the EIS.

The EIS and CPO application were submitted to An Bord Pleanála in October 2003. A public oral hearing was held in April 2004 and the scheme was approved in July 2004 subject to a number of conditions and amelioration measures.

2.4 Scheme Implementation

2.4.1 Scheme Management Structures

The preliminary design of the scheme was carried out in accordance with the Design Manual for Roads and Bridges applicable at that time.

2.4.2 Scheme Schedule, Management and Costs

The Limerick Tunnel PPP Scheme was procured as a PPP. The scheme implementation in terms of the delivery of the scheme to the specification as set out in the PPP Contract, the management of the PPP Contract, the budget schedule, and the budget outturn are explored in detail in Section 5, where the performance of the scheme is reviewed in terms of anticipated outcomes.

2.5 Scheme Operational Performance

2.5.1 Traffic Outcomes on the New Road

The objectives of the Limerick Tunnel PPP Scheme include:

- Improve access from the National Primary network into the Greater Limerick area;
- Reduce traffic volumes in Limerick city centre;
- Reduce journey times;
- Reduce accident rates;
- Improve air and noise quality;
- Facilitate the safe and efficient movement of people and goods in the interest of the economy;
- Increase the potential for economic development in anticipation of a transfer of investment funding and employment opportunity from the east coast as part of the National Spatial Strategy;
- Strengthen and improve the regional road network.

The achievement of such objectives largely depends on the success in attracting traffic to the scheme. In this context, the key question is how the scheme has performed relative to the level of traffic volumes that were predicted to use the scheme.

The traffic study undertaken¹⁰ contains traffic predictions for 2008 and 2028 for the scheme. Interpolating between these dates yields the equivalent traffic predictions for the initial years of the scheme's operation.

Table 2.5 compares the predicted traffic levels with the actual volumes of traffic realised on the tolled section of the scheme.

¹⁰ Traffic Report – Limerick Southern Ring Road Phase II (Colin Buchanan & Partners, July 2002)

Table 2.5 – Comparison of Forecast and Actual Traffic Volumes (AADT), 2010-2014 Tunnel

Year	Traffic Study	Actual
2010	28,478	12,849
2011	29,154	14,836
2012	29,830	15,197
2013	30,506	16,102
2014	31,183	17,589

Sources: Traffic Report – Limerick Southern Ring Road Phase II (Colin Buchanan & Partners, July 2002); NRA traffic data

It is clear that for the first five years of the scheme's operation there is a significant shortfall in traffic volumes using the tunnel (tolled section). The average traffic volumes using the scheme have increased from 55% below the levels predicted in the traffic study in 2010 to 44% below in 2014. In the first four full years of operation, the shortfall was 47%. Although the volumes are showing a positive trend, this is a significant shortfall compared to the levels predicted.

The traffic levels using the scheme are likely to be different from those forecast due to:

- The overall level of traffic using the N18 being less than forecast; and
- The level of diversion due to tolling being higher than forecast.

In order to understand which of these factors has the greatest impact, the volume of traffic using the N18 route immediately north of the scheme is examined in Table 2.6. This is a measure of all traffic flowing to/from the scheme and to/from the old N18 route to Limerick City.

Table 2.6 – Comparison of Forecast and Actual Traffic Volumes (AADT), 2008-2014 North of Scheme

Year	Traffic Study	Actual
2008	35,493	34,827
2009	35,924	34,437
2010 [^]	36,354	34,048
2011	36,785	33,268
2012	37,215	33,359
2013	37,646	33,450
2014	38,076	33,921

Sources: Traffic Report – Limerick Southern Ring Road Phase II (Colin Buchanan & Partners, July 2002); NRA traffic data
[^]Limerick Tunnel PPP Scheme opened July 2010

It can be seen that the actual levels are circa 90% of the levels forecast. This indicates that the lower than expected level of traffic volumes on the N18 route as a whole is not the major contributor to the significant shortfall in traffic using the scheme.

It should be noted that the N18 Gort to Crusheen scheme (to the north of the Limerick Tunnel PPP Scheme) opened in November 2010. This scheme makes the N18 route more attractive to road users and therefore may have helped support the level of traffic using the route as a whole.

A far larger contributor to the traffic shortfall is the level of diversion being much higher than forecast and accordingly a lower level of congestion relief in Limerick City than had been forecast. The lower level of overall time savings would in turn point to lower outturn economic return on the project than had been forecast.

Given the extent of the shortfall in traffic using the scheme to date, the NRA commissioned an updated traffic forecast and cost benefit analysis for the scheme which was completed in January 2015¹¹. The major benefits include time savings for roads users and, to a lesser extent, accident reduction. The costs included the construction and operational costs associated with the scheme. It should be noted that as tolls constitute both a cost to the road user and a benefit to the provider of the road, the level of tolls has no net impact on the economic appraisal of the project.

The results of this study are shown in Table 2.7.

Table 2.7 – Results of Updated Economic Evaluation (2009 prices & values)

Description	Amount
Present Value of Benefits €m	720
Present Value of Costs €m	220
Net Present Value €m	500
Benefit to Cost Ratio (BCR)	3.3

Sources: Limerick Southern Ring, Cost Benefit Analysis (AECOM, January 2015)

It is seen that as a result of the changes since the last analysis (primarily the lower level of traffic using the scheme) the BCR has dropped from 4.7 to 3.3. Although this is a significant reduction, the economic case for the scheme remains very strong.

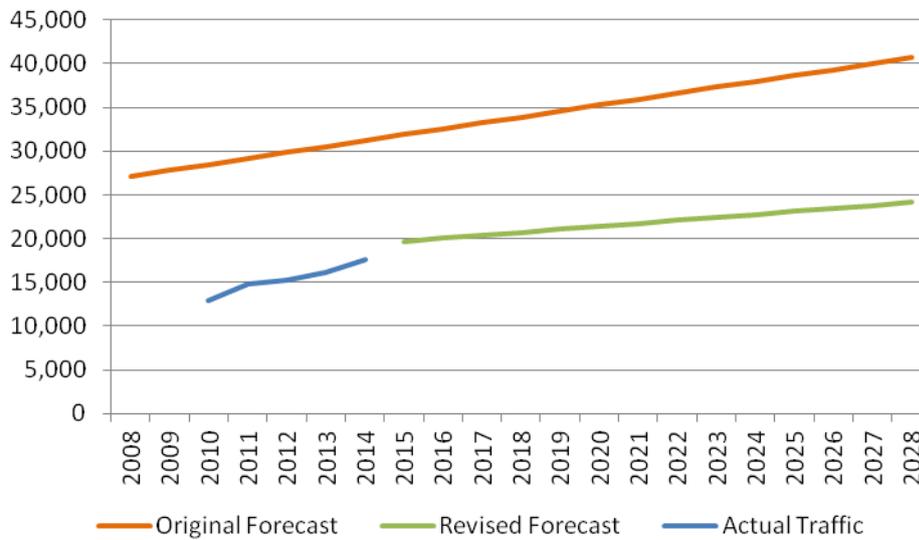
It should be noted that in addition to revised traffic forecasts, the updated economic evaluation included use of the most recently available guidance including an evaluation period of 30 years. The previous economic evaluation was carried out over a period of 20 years. If the revised economic evaluation was carried out over a similar period, it is estimated that the benefit to cost ratio would be circa 1.8. This indicates a strong economic case for the project even over the shorter time period.

The net present value also remains very strong at €500 million (2009 prices and year). However, this cannot be directly compared to the previous result given the changed price and present value year used.

The revised traffic forecasts used in the in the updated economic evaluation (January 2015) are shown in comparison to the original forecast and actual traffic to date in Figure 2.2.

¹¹ Limerick Southern Ring, Cost Benefit Analysis (AECOM, January 2015) – See Appendix D

Figure 2.2 – Traffic Forecasts and Actual Traffic (AADT)



The revised traffic forecast is circa 60% of the original traffic forecast. It is notable that despite the reduction in the level of traffic, the scheme is forecast to generate significant benefits through improved journey times and congestion relief in Limerick City.

Table 2.8 shows the heavy goods vehicle (HGV) share of traffic volumes is below the level forecast. The volume of traffic made up of light vehicles (motorbikes, cars and light goods vehicles) is higher as a share of total traffic but still well below the forecast level in absolute terms.

Table 2.8 – Share of Traffic by Vehicle Type, Forecast and Actual

	Motorbike, Car	LGV	HGV	Bus, Coach
Economic Appraisal	84.5%	9.0%	6.1%	0.4%
2010 Actual	87.2%	8.4%	3.9%	0.5%
2011 Actual	87.2%	8.1%	4.1%	0.6%
2012 Actual	86.8%	8.4%	4.2%	0.6%
2013 Actual	86.1%	8.8%	4.4%	0.7%
2014 Actual	85.8%	9.1%	4.3%	0.8%

Sources: Economic Appraisal (Jacobs Consultancy, Jul 2004); NRA traffic data

We can gain further insight to this HGV traffic shortfall through examination of data from November 2013 when a HGV toll free month was implemented by the then Minister for Transport, Tourism & Sport at selected toll locations. The HGV toll free initiative resulted in a 45% increase in the number of HGVs using the tolled section¹². This increase was estimated based on a month-on-month comparison of weekday volumes. This was the largest increase for any of the schemes included in the study and demonstrates the level of HGV diversion caused by the imposition of tolling on this scheme.

Although the Limerick Tunnel PPP Scheme did not lead to as large a reduction as forecast in HGV traffic through Limerick City, the scheme does enable such future actions to be taken by providing an alternative route option for HGV traffic. At the time the Limerick Tunnel was being procured Limerick City Council had published a City Centre traffic management strategy. The plans provided for a range

¹² Assignment of Toll Diversion Rates During Toll-Free November (ROD-AECOM, March 2014)

of city centre measures including pedestrianisation, bus lanes and public realm enhancements in the city. These developments would have made transiting the city less attractive to road users relative to using the Limerick Tunnel PPP Scheme. The fact that these developments (which were incorporated into the traffic modelling assumptions) largely did not materialise has negatively impacted the volumes of traffic using the scheme.

2.5.2 Road Safety Outcomes

One of the objectives associated with the scheme was a reduction in the level of accidents. Research has indicated that, historically, dual carriageways have proved to be twice as safe as two-lane roads in general.¹³ In addition, the Limerick Tunnel PPP Scheme has led to a reduction in traffic traversing Limerick city-centre.

In the case of inter-urban schemes, the accident rate on the corridor encompassing the new and old route is examined over time to understand the impact of the scheme. In the case of the Limerick Tunnel PPP Scheme, an area bounded by (and including) the M7, N18 and R445 is examined.

In the period since the Limerick Tunnel PPP Scheme opened in July 2010 to the end of 2012, there were no serious or fatal collisions on the scheme itself. However, there were within the study area examined.

There has also been a notable reduction in serious and fatal collisions in the study area, most likely due to a reduction in traffic.

Although only two full years of data is available, the reduction in both serious and fatal collisions in the study area is a positive outcome.

Table 2.9 – Number of Serious and Fatal Collisions in the Study Area

	Serious	Fatal	Total
2005	5	2	7
2006	4	2	6
2007	6	2	8
2008	5	2	7
2009	3	5	8
2010	7	2	9
2011	5	1	6
2012	4	0	4

Source: Road Safety Authority Collision Statistics

2.5.3 Overall Economic Return to the State

The Limerick Tunnel PPP Scheme is likely to deliver on a number of its objectives including the reduction of traffic volumes in Limerick city-centre and contribute to a reduction in the number of accidents.

Despite the significant shortfall in traffic volumes from the level forecast (circa 47%), the updated economic evaluation (including revised traffic forecasts) forecasts a large positive economic return with a BCR of 3.3.

¹³ See: D O’Cinneide at al. Inter-urban Accident Rates by Road Type and Geometric Elements. Association of European Transport, 2004.

2.6 Summary

Since the opening of the Limerick Tunnel PPP Scheme, large volumes of traffic have used the dual carriageway, and it has contributed to a reduction in the volumes of traffic in Limerick city-centre.

The traffic volumes using the scheme to date are circa 47% below the levels predicted.

Despite the significant shortfall in traffic volumes from the level forecast, the updated economic evaluation forecasts a large positive economic return with a BCR of 3.3.

To date, the safety record of the scheme indicates that it is delivering benefits through accident reduction.

The scheme was successfully planned and implemented. The preliminary design of the scheme was carried out in accordance with the Design Manual for Roads and Bridges applicable at that time.

The economic analysis was not updated prior to contract award, when revised cost estimates and traffic forecasts associated with a PPP procurement of the scheme were available. Although a review of the decision to proceed with the scheme was required under the guidance in force at the time, an updated CBA was not required unless significant additional costs arise¹⁴. A revised CBA at the tendering stage now forms part of the NRA's Project Appraisal Guidelines, which addresses this shortcoming for all current/future schemes.

¹⁴ Guidelines for the Appraisal and Management of Capital Expenditure Proposals in the Public Sector (Department of Finance, Jan 2005)

3 PPP Pre-Planning Review

3.1 Introduction

This section reviews the pre-planning steps completed by the NRA in progressing the Limerick Tunnel PPP Scheme as a PPP.

3.2 Background

A PPP is a partnership between the public and the private sector for the purpose of delivering a project. There is a sharing of project risks between the public and private sectors. A PPP project benefits from an accelerated implementation through the availability of private sector funding. This is particularly the case in situations of limited public finances, where access to private sources of funding allows the progression of projects that would not otherwise be possible.

A number of guidance documents have been published by the authorities with responsibility for implementing PPPs, since the first PPPs were procured in Ireland over ten years ago. A summary of some of the key PPP guidance documents is provided in Appendix A. There are a number of planning steps recommended when considering a scheme as a potential PPP.

3.3 PPP Scheme Selection

The *National Development Plan (NDP), 2000 - 2006* included an objective for the concentration of investment on the five strategic national roads linking the main urban areas in the country. The NDP confirmed the policy for PPPs on being the maximum usage of PPP consistent with the principles of efficiency and best value for money. Minimum targets for PPP private funding were included in the NDP, including 23% of the total €5.97 billion 2000 – 2006 road investment programme.

On 1st June, 1999, the Minister for Finance announced three pilot PPP roads projects for implementation by the Authority which included the Limerick Tunnel PPP Scheme.

The decision to proceed with the scheme as a PPP was then assessed quantitatively as detailed in the following sections.

3.4 Assessment of Shadow Bid Model

Prior to the commencement of the PPP tender process a Shadow Bid Model (SBM) was developed by the financial advisors (KPMG). The SBM included the following input information:

- Projected traffic and toll level information provided by the NRA's traffic advisors;
- Scheme costs provided by NRA and/or its technical advisers; and
- Financing assumptions in relation to debt, equity and economic assumptions.

The SBM was used to run a variety of financial scenarios which illustrated (or 'shadowed') how a private sector bidder might approach the scheme. The Shadow Bid Model is used to inform decisions in relation to the structuring of the transaction to be provided for in the tender requirement. An overview of certain financial related tendering requirements as provided for in the Limerick Tunnel PPP Scheme tender invitation documents are set out in the table below.

Table 3.1 – Tender Requirements

Key Features of Limerick Tunnel PPP Scheme Tender Requirements

- Construction and operational payments were available up to set limits and conditions
- Tenderers would be entitled to collect tolls for up to 30 years and were required to share a proportion of the toll revenue with the NRA based on traffic volumes. The option was available for tenderers to bid Variant Tenders with a 35 year concession period.
- The Tenderer would be subject to non-availability payments which would be payable by the Tenderer to the NRA
- The Tenderer was not permitted to generate excessive returns from the project and therefore bids had to include an increasing revenue share for the NRA as vehicle numbers increase.
- A traffic guarantee was provided which provided a traffic floor below which PPP Co would be compensated for shortfalls in traffic.

3.5 Value for Money (VFM) Assessment

The PPP planning guidance states that the decision to procure a project as a PPP should be based on a VFM assessment. This assessment compared the costs of procuring the scheme by traditional means (the Financial Comparator) with the equivalent costs of procuring the scheme by means of a PPP.

VFM comparisons were undertaken at various stages in order to ensure the continuing rationale for procuring the scheme through a PPP option. These stages are as follows:

- Following receipt of Invitation to Negotiate (ITN) Tenders;
- Following the receipt of an updated submission from the Provisional Preferred Tenderer; and
- Shortly before financial close (to reflect any material changes in the Provisional Preferred Tenderer)

Under the 2006 Department of Finance guidelines, formal VFM tests should also have been carried out to determine whether, and in what form, a PPP arrangement has the potential to offer the best value for money and at completion of the Public Sector Benchmark. The Authority explored the appropriate payment mechanism and carried out formal VFM tests adhering to this guidance.

A financial comparator was prepared as part of the Value for Money Assessment of the Limerick Tunnel PPP Scheme, which identified the costs of procuring the scheme using a traditional procurement approach.

It should be noted that tenderers were required to make their own traffic forecasts. In some cases, these were higher than the NRA's estimate. In carrying out the Value for Money assessments, the NRA's traffic estimates were used to forecast revenue share and potential traffic guarantee payments. Using the NRA's traffic forecasts ensured a sound basis for the VFM and allowed all tenders to be compared on an equal footing.

3.6 Preparation of the Financial Comparator

The Financial Comparator (FC) consists of an assessment of the total costs that would be incurred in the provision of a scheme through a traditional procurement scenario in which the public sector retains managerial responsibility and exposure to risk. In preparing the FC for the Limerick Tunnel PPP Scheme, NRA Guidelines and Design Standards for road development were used, as was the experience in preparing previous Financial Comparators by the NRA's specialist advisors i.e. technical (Jacobs Babtie) and financial (KPMG).

As per the Guidance, the costs included in the FC were as follows:

- Base costs: the public sector's estimate of the costs it would incur to design, construct, maintain and manage the infrastructure for the duration and to the specification of the contract, before allowing for contingencies or risks.
- Retained risks: these risks, by their nature, always rest with the public sector;
- Risk retained under traditional procurement, but transferred under PPP: an allowance for the additional costs to the public sector as a consequence of the risks associated with the project.
- Efficiency adjustments: allows for the public sector improving its performance in managing base costs and the impact of risks over the life of the project.

As per the guidance, the FC was prepared prior to the receipt of ITN Tenders, to ensure it represented the NRA's best estimate of the cost of delivering the services required under the PPP scheme without being influenced by knowledge of the private sector's actual proposals¹⁵.

3.7 Risk Assessment

In line with the Guidance, in preparing the FC, the risks capable of being quantified, that differed between the public and private sectors were assessed.

The approach to valuing of risk was based on a database of risk knowledge gained as part of the closing of three PPP deals, the preparation of five financial comparators for previous PPP schemes, as well as information emerging from NRA schemes procured using Design and Build methods. The approach used was to assign a generic range of probabilities to each major risk category (Capital, Operational, Demand etc), on the basis of risk estimates from previous schemes. The probabilities were applied to the total cost estimates of each category to quantify the level of risk for the category as a whole.

Risks not amenable to quantification, but with the potential to influence the VFM assessment, were identified separately as part of the VFM assessment.

3.8 PPP Procurement Steps

Public Private Partnerships are a form of procurement and as such are subject to all the normal discipline applying to procurement generally, including Department of Finance procurement guidelines as well as EU Procurement Directives. KPMG Corporate Finance, Jacobs Babbie and McCann Fitzgerald Solicitors provided advice to the NRA throughout the procurement process.

It is common in a procurement process to select two or more preferred tenderers and carry out a Best and Final Offer (BAFO) stage. Alternatively, a single tenderer can be selected as the Provisional Preferred Tenderer (PPT) to negotiate a contract with. In the case of this procurement procedure, a single tenderer was selected.

The procurement of the PPP scheme was conducted in an open and transparent manner, and in line with the relevant EU and national regulations.

3.9 Summary

The planning steps implemented by the NRA prior to procuring the Limerick Tunnel PPP Scheme as a PPP were reviewed and found to be in line with the official PPP implementation guidance. The relevant steps advocated in the guidance documents were implemented by the NRA.

As set out in Section 2, the steps above would have been enhanced by the completion of a revised economic appraisal at the tendering stage – although this was not a requirement under the guidance in place at the time. This would ensure explicit consideration would be given to updated cost/traffic projections relating to the scheme. As noted in Section 2, a revised CBA at the tendering stage now forms part of the NRA's Project Appraisal Guidelines, which addresses this shortcoming for all current/future schemes.

¹⁵ Two Financial Comparator scenarios were modelled, one with public sector tolling and one without tolling

4 PPP Procurement Review

4.1 Introduction

This section includes a review of the VFM assessment undertaken to determine if the basis on which the decision was taken to procure the scheme as a PPP was appropriate.

4.2 Outcome of VFM Assessment

The VFM Assessment compared, over the lifetime of the scheme, the Net Present Value (NPV) of the Exchequer cash flows associated with the traditional procurement scenario, with the NPV of the Exchequer cash flows associated with the PPP procurement scenario.

Table 4.1 sets out, in summary format, the NPV of the NRA and Exchequer costs and revenues associated with both procurement options.

Table 4.1 – Summary of Exchequer Costs of the Scheme

Financial Comparator (Traditional Procurement – with tolling)	NPV € m	PPP Option Preferred Tenderer	NPV € m
Base Costs (ex VAT)	384.1	Construction payments	166.7
Toll Costs (ex VAT)	145.1	Operational payments	35.3
Toll Revenue	(535.6)	Weighted Average Revenue Share	(137.6)
		35 Year Adjustment	27.2
Total Non-Risk adjusted cost to the NRA	(6.4)	Offer Price	91.6
Risks Retained (Costs)	108.9	Retained Risks in either FC or PPP	11.8
Risks Retained (Revenue)	157.2		
Total Risk Adjusted Cost to the NRA	259.7	Total Risk Adjusted Cost to the NRA	103.4
Less incremental cash flows to Public Sector	(70.9)	Less incremental cash flows to Public Sector ^A	(52.7)
Total Risk Adjusted Cost to the Public Sector	188.8	Total Risk Adjusted Cost to the Public Sector	50.7

Source: VFM Report, Limerick Tunnel PPP Scheme (Jacobs Babbie, McCann FitzGerald, August 2006)

As set out in the table above, there were estimated net costs to the Public Sector associated with the PPP option, totalling €51 million, compared to an estimated cost of traditional procurement totalling €189 million, a difference of €138 million.

The higher estimated public sector costs associated with the (tolled) traditionally procured option relative to the PPP option resulted in the decision being taken to procure the scheme as a PPP.

In the first four full years since the opening of the Limerick Tunnel PPP Scheme, the traffic levels using the scheme have been circa 53%¹⁶ below the level estimated by the NRA in the VFM.

As a result, the NRA commissioned an updated economic evaluation which included an updated traffic forecast.

Using the updated traffic forecast the following adjustments have been estimated to apply to Table 4.1:

- A decrease in the level of Toll Revenue (and Retained Revenue Risk) of 43% leading to an increase in cost of the Traditional Procurement option of circa €165 million (2006 present value);
- A decrease in the level of Revenue Share of 84% leading to an increase in cost of the PPP option of circa €120 million (2006 present value); and
- A Traffic Guarantee payment leading to an increase in the cost of the PPP options of circa €120 million (2006 present value).

The estimated impact of these changes is shown in Table 4.2.

Table 4.2 – Revised Costs of the Scheme (estimated based on actual traffic data)

	Traditional Procurement €m	PPP €m
Total Risk Adjusted Cost (from VFM report)	189	51
Toll Revenue Decrease	165	
Revenue Share Decrease		120
Traffic Guarantee		120
Total Revised Cost	354	291

Overall, this results in a decrease in the difference between the PPP option and the Traditional Procurement option from €138 million to circa €60 million

As this difference remains positive (i.e. the PPP option remains the lower cost option), the decision to opt for PPP over traditional procurement remains correct.

These changes are discussed in more detail in Section 5 below.

4.3 Review of Components of Financial Comparator

A review was undertaken to determine if the individual cost and revenue items included in the Financial Comparator and PPP options represent accurate approximations of the costs and revenues attributable to the Exchequer under each procurement option. Full details of this review are included in Appendix B which can be summarised as follows:

- The total risk adjusted costs used in the Financial Comparator are broadly in keeping with the total risk adjusted cost from preferred tenderer;
- The risk values associated with the FC scenario revealed that the cost risk values of €109 million (21% of total costs) are broadly acceptable; and
- Traffic volumes are significantly below the forecasts used to estimate Toll Revenue (circa 53%). This is in excess of the 29% risk factor that was applied to Toll Revenue to account for the risk associated with uncertain incomes.

¹⁶ The traffic volumes using the scheme to date are circa 47% below the levels used in the economic appraisal and 53% below the levels used in the value for money assessment

4.4 Summary

The NRA's decision to procure the Limerick Tunnel PPP Scheme as a PPP was based on a VFM Assessment. The results of the VFM assessment showed there were higher NRA costs to the order of €138 million associated with a traditional procurement relative to the PPP option, which resulted in the decision being taken to procure the scheme as a PPP.

Following a detailed review of the components of the VFM assessment, it was determined that the net cost of both the traditional procurement and the PPP option were potentially underestimated. This is due to the significantly lower levels of traffic realised on the scheme once built.

The key changes are

- A decrease in the level of Toll Revenue increasing the cost of the Financial Comparator;
- A decrease in the level of Revenue Share increasing the cost of the PPP option; and
- A Traffic Guarantee payment increasing the cost of the PPP option.

Overall, the impact of these changes is a decrease in the difference between the risk adjusted cost to the Public Sector for the traditional procurement method and the PPP option.

However, the PPP option remains the lower cost option and therefore the decision to procure the scheme as a PPP represented value for money for the Exchequer and is considered the appropriate decision for the scheme.

5 PPP Scheme Implementation Review

5.1 Introduction

This section reviews the implementation of the Limerick Tunnel PPP Scheme to date. The scheme's implementation is reviewed across three key criteria, as follows:

- **Timing:** A review of the time taken to complete the various stages of the scheme
- **Quality:** An analysis of whether the key elements of the scheme as per the project specification were achieved; and
- **Costs and Revenues/Traffic Volumes:** an analysis of the public sector costs associated with PPP scheme relative to initial estimates.

5.2 Timing of PPP Scheme Implementation

As part of its 2000 Best Practice Guidelines, the Department of the Taoiseach (DOT) stated that a PPP approach should be adopted wherever it would “*accelerate the implementation of a particular project*”. In the Framework for Public Private Partnerships - Working Together for Quality Public Service, published by the Social Partners in 2000, the principles underpinning the PPP programme were set out, including: “*PPPs should maximise the benefits of private sector efficiency, expertise, flexibility and innovation*”.

Table 5.1 and Table 5.2 set out the procurement and construction periods associated with the Limerick Tunnel PPP Scheme.

Table 5.1 – Procurement Timelines

Date	Task
Pre Qualification	
April 2004	OJEU Notice
ITN Tender Phase	
January 2005	Tender Invitation Documents Issued
July 2005	Submission of Tenders for Short Listing
Preferred Tenderer Phase	
September 2005	Preferred Tenderer Selected
March 2006	Confirmation of Preferred Tenderer
August 2006	Contract Award
Road Opening	
July 2010	Road Opening

Source: NRA

Table 5.2 – Limerick Tunnel PPP Scheme Timelines

	No of Months
Start Procurement - end Procurement	28
Start Construction - end Construction	47
Start Procurement - end Construction	75

The procurement period, from date of first issue of the OJEU notice to contract award to the successful PPP bidder, totalled 28 months with the period from issue of ITN to Contract award being 19 months. The PPP contract was awarded to the successful bidder in August 2006. The dual carriageway scheme was opened 47 months later, in July 2010.

It was not possible to identify equivalent procurement and construction timeframes for roads of a similar scale to the Limerick Tunnel PPP Scheme¹⁷. As such, the review of the scheme's timeliness is restricted to a review of the targets set for the scheme. The dual carriageway scheme was scheduled to be complete in September 2010. The actual dual carriageway opening took place in July 2010, two months ahead of schedule.

5.3 Quality of PPP Scheme Implementation

In reviewing the PPP scheme's implementation, a number of key areas were reviewed:

- the delivery of the scheme to the specification of the PPP contract;
- the management procedures put in place by the NRA; and
- the contract management in the design, construction and operational phases.

5.3.1 Delivery of Key Element of the Scheme

The Limerick Tunnel PPP Scheme was delivered in line with the contract specification.

5.3.2 PPP Management by the NRA

The progression of the scheme was managed by a newly established PPP unit within the NRA. In line with published guidance, the NRA contracted legal, financial and technical advisers to assist with:

- the devising of an appropriate procurement mechanism;
- the drawing up of detailed contract documents; and
- assessing and selecting PPP consortia for the scheme.

To date, the management of the PPP scheme contract has run smoothly. The PPP Concessionaire, in line with its obligations, has provided the NRA with its reporting requirements, including: Winter maintenance reports; Annual reports; Annual performance reports; five yearly management plans; Pavement condition reports (weekly and quarterly), Structures condition reports (routine and principal inspections) and Monthly O&M reports.

5.3.3 Contract Management during Design and Construction

The NRA contracted technical engineers to project manage the design and construction of the scheme on its behalf. Over the course of the construction period, the NRA was provided with a monthly construction period report.

5.3.4 Contract Management during Operation

The NRA's management of the operational phase of the PPP contract has operated on the same basis as the design and construction phase, namely technical support has been contracted in as required. NRA staff members are allocated supervisory roles for individual PPP schemes. As part of this supervisory role, the NRA staff member is responsible for reviewing the reports provided by the PPP Concessionaire, making on-sites visits to the scheme and administering the contract.

¹⁷ Such a comparison would be possible if the schemes in the PPP programme were compared to a sample of similar non PPP road schemes.

5.4 Outturn Cost of PPP Scheme

One of the key principles underpinning the implementation of PPP infrastructure projects in Ireland is the obtaining of better Value for Money for the NRA and the Exchequer. The Department of Finance PPP Implementation guidance (see Appendix A) stated that Ex-Post Reviews of PPP Schemes should contain a comparison of the actual PPP outturn costs (as provided for in the PPP contract¹⁸) with the initial estimated costs of the scheme (as set out in the Financial Comparator).

The actual PPP outturn cost to the Exchequer is identified in the PPP contract and as such, the PPP outturn cost remains unchanged except where:

- any variation costs are potentially introduced after financial close; and/or
- the revenue share payable from the PPP scheme is different to that estimated in the tender evaluation process.

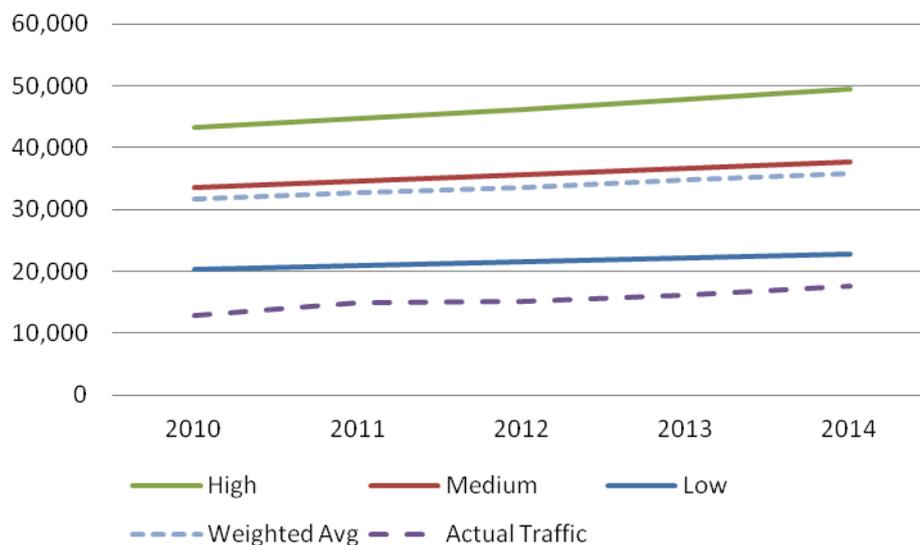
The estimated NRA costs associated with the preferred PPP option totalled a net cost of €103 million (see Table 4.1). This does not include costs associated with statutory procedures, planning, preliminary design etc. which were common across the PPP and traditional procurement options.

Since the signing of the PPP contract with the concessionaire there have been a number of traffic guarantee payments totalling circa €20m arising from the PPP scheme. The payments are expected to continue until 2033. The present value (2006 year) of these traffic guarantee payments is forecast to be circa €120m. These lead to an effective doubling of the scheme cost to the NRA.

5.4.1 Traffic Levels

Table 5.3 and Figure 5.1 below set out a comparison of the NRA traffic forecasts used as part of the VFM Assessment process and the actual traffic volumes which have materialised since the opening of the scheme in July 2010.

Figure 5.1 – Forecast NRA (VFM) and Actual Traffic Volumes (Source: NRA)



¹⁸ The actual costs incurred by the PPP Concessionaire in providing the infrastructure and services as per the specification incorporated into PPP contract is unknown, because the Concessionaire is not required to provide this information to the NRA. The outturn cost data that is available relates to the estimated outturn NRA costs associated with the PPP Contract, as signed by the Concessionaire at Financial Close. This cost estimate incorporates any agreed contributions to construction and operational costs payable by the NRA to the Concessionaire less any revenue share payable to the NRA.

Table 5.3 – Forecast NRA and Actual Traffic Volumes

Year	Low	Medium	High	Weighted Average	Actual Traffic	% difference (WA & Actual)
2010	20,365	33,473	43,200	31,655	12,849	-59%
2011	20,951	34,497	44,692	32,639	14,836	-55%
2012	21,553	35,551	46,236	33,655	15,197	-55%
2013	22,173	36,638	47,834	34,701	16,102	-54%
2014	22,811	37,758	49,487	35,781	17,589	-51%

Source: NRA

As Table 5.3 highlights, aggregate traffic volumes annually have been below the low traffic forecasts since the opening of the Limerick Tunnel PPP Scheme in July 2010. In the first four full years of operation, the traffic levels were, on average, 53%¹⁹ below the weighted average projection. In 2014, it was 51% below.

The VFM assessment estimated 6% of traffic would be heavy goods vehicles (HGVs). Since opening, the Limerick Tunnel PPP Scheme HGV composition has been lower than forecast with outturn heavy vehicles share of approximately 4%.

Table 5.4 – Heavy Goods Vehicles (HGVs) as a Proportion of all Vehicles

Year	Heavy Goods Vehicles (HGV) as a Proportion of all Vehicles
VFM	6.1%
2010 Actual	3.9%
2011 Actual	4.1%
2012 Actual	4.2%
2013 Actual	4.4%
2014 Actual	4.3%

Source: NRA

It is notable that the opening of the Limerick Tunnel PPP Scheme occurred during a time of significant economic difficulties in Ireland. This had a sizeable impact on the volume and type of traffic using Ireland's roads. The proportion of shortfall in traffic volumes using the Limerick Tunnel PPP Scheme that are due to the economic situation is not known. In the coming years, as Ireland's economy recovers, traffic volumes are likely to increase.

5.4.2 Revenue Share Payments

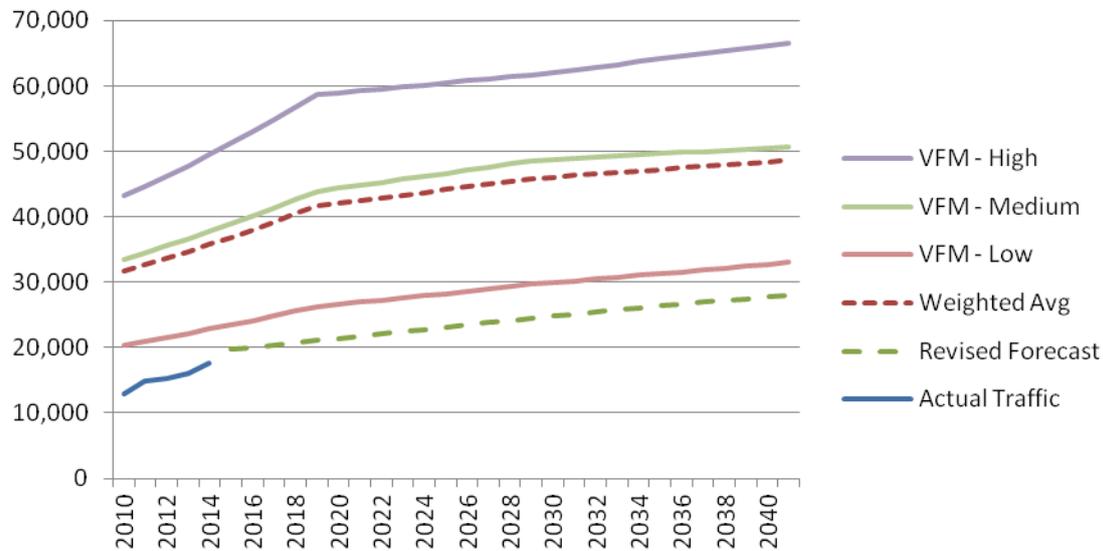
The traffic volumes in the initial years of the dual carriageway opening have resulted in no revenue share payments being made to the NRA. Had the traffic volumes been at the weighted average level used in the VFM process, revenue share payments would have been made. It is estimated that there will be an 84% shortfall (measured in 2006 present value terms) in revenue share payments over the life of the PPP concession.

5.4.3 Implications for Total Outturn Cost associated with PPP Option

As set out above, initial traffic levels using the scheme have been significantly below the levels forecast as part of the Value for Money assessment process. The future forecasts used in the VFM assessment are examined against the revised forecasts developed in January 2015. These are shown in Figure 5.2 below.

¹⁹ The traffic volumes using the scheme to date are circa 47% below the levels used in the economic appraisal and 53% below the levels used in the value for money assessment

Figure 5.2 – Forecast NRA (VFM), Actual and Revised Forecast Traffic Volumes (Source: NRA)



It is clear that the future forecasts used in the VFM process are higher than the most up to date forecasts available. This will result in reduced revenue share payments from the PPP Concessionaire and significant traffic guarantee payments to the PPP Concessionaire over the life of the project.

These have been estimated in Section 4.2 above. The result is an increased cost to the State but the decision to procure the scheme via PPP remains valid from a value for money point of view.

5.5 Summary

The Limerick Tunnel PPP Scheme's implementation was reviewed in terms of the timing of the scheme, the quality achieved by the scheme and the actual materialised costs of the scheme against initial estimates.

The construction of the scheme commenced in August 2006 and the scheme opened in July 2010, two months ahead of schedule.

The Limerick Tunnel PPP Scheme was delivered in line with the contract specification.

Since the opening of the Limerick Tunnel PPP Scheme, the traffic volumes using the dual carriageway have been significantly lower (circa 53%²⁰) that those forecast as part of the VFM assessment process. As a result, there have been no revenue share payments and traffic guarantee payments have been made.

Due to the level of traffic using the scheme being much lower than predicted, there will be significantly reduced revenue share payments from the PPP Concessionaire and significant traffic guarantee payments made to the PPP Concessionaire over the life of the project.

²⁰ The traffic volumes using the scheme to date are circa 47% below the levels used in the economic appraisal and 53% below the levels used in the value for money assessment

6 Summary and Conclusions

In general, the Limerick Tunnel PPP Scheme was adequately planned both in terms of the statutory procedures, route selection and consultation and the planning undertaken in relation to the decision to procure the scheme as a Public Private Partnership (PPP).

During the implementation of the scheme, the appropriate management procedures adopted were satisfactory and in line with best practice guidance at the time. The implementation of the scheme as a PPP resulted in the scheme being delivered ahead of schedule and in line with the quality specified in the PPP contract.

Since the opening of the Limerick Tunnel PPP Scheme, large volumes of traffic have used the dual carriageway, and it has contributed to a reduction in the volumes of traffic in Limerick city-centre. To date, the safety record of the scheme indicates that it is delivering benefits through accident reduction.

However, the traffic volumes using the scheme to date are circa 47% below the levels predicted in the economic appraisal and 53% below the levels used in the VFM assessment. It is notable that the opening of the Limerick Tunnel PPP Scheme occurred during a time of significant economic difficulties in Ireland. This had a sizeable impact on the volume and type of traffic using Ireland's roads. The proportion of shortfall in traffic volumes using the Limerick Tunnel PPP Scheme that are due to the economic situation is not known. In the coming years, as Ireland's economy recovers, traffic volumes are likely to increase. Despite the significant shortfall in traffic volumes from the level forecast, the updated economic evaluation forecasts a large positive economic return with a BCR of 3.3.

Following a detailed review of the components of the VFM assessment, it was determined that the net cost of both the Financial Comparator and PPP option were potentially underestimated. This is due to the significantly lower levels of traffic realised on the scheme once built.

The key changes are:

- A decrease in the level of Toll Revenue increasing the cost of the Financial Comparator;
- A decrease in the level of Revenue Share increasing the cost of the PPP option; and
- A Traffic Guarantee payment increasing the cost of the PPP option.

Overall, the impact of these changes is a decrease in the difference between the risk adjusted cost to the Public Sector for the traditional procurement method and the PPP option.

However, the PPP option remains the lower cost option and therefore the decision to procure the scheme as a PPP represented value for money for the Exchequer and is considered the appropriate decision for the scheme.

Appendix A: Overview of PPP Guidance

Developing the Infrastructure Requirements of the National Development Plan: Best Practice Guidelines for Project Implementation, Department of the Taoiseach, 2000

As part of its 2000 Best Practice Guidelines, the Department of the Taoiseach (DOT) stated that a public private partnership approach should be adopted wherever it would accelerate the implementation of a particular project and represent better value for money over the full life cycle of the project. The DOT also stated that the most appropriate form of PPP (ranging from design and build to design, build, finance and operate) should be adopted having regard to the particular circumstances of the individual project.

Framework for Public Private Partnerships, Working together for Quality Public service. 2000

In 2000, a framework document endorsed by IBEC, ICTU, CIF, the Department of Finance and the Departments and Agencies engaged in the PPP process was published by the Social Partners. In the Framework a clear statements of the principles underpinning the PPP programme were set out, namely:

- PPPs should yield value for money for the Exchequer;
- PPPs should allocate risks to the party best able to control and manage them; and
- PPPs should maximise the benefits of private sector efficiency, expertise, flexibility and innovation.

A Policy Framework for Public Private Partnerships (PWC), DOEH&LG 2000

In 2000, the then Department of Environment, Heritage and Local Government commissioned PWC to produce a framework within which PPP projects could be advanced in the roads, water and waste sectors. The resultant Policy Framework detailed policy guidance covering each stage in the development, implementation and management of PPP projects. Some of the key guidance points identified in the resulting policy framework document include:

- **Market soundings** should be undertaken to determine the level of interest among the private sector and the capability of the private sector market to undertake prospective PPP projects.
- An **Output Specification** should be prepared which defines the services required by the public sector which the private sector would be responsible for providing as part of a PPP project. The actual design of the works necessary to deliver that service would be left to the successful private sector tenderer.
- A key driver of the PPP programme is the desire to increase **Value for Money (VFM)** in infrastructure procurement. To ensure that value for money is achieved, the Contracting Authority should be able to demonstrate that the option selected offers better value for money than the alternatives. The VFM assessment should not be seen as a single step but one that is carried through the life of the project. An initial PPP Assessment should be completed at the Option Appraisal stage to determine the potential for a PPP to deliver improved value for money compared with a traditional procurement. The final VFM assessment can only be made at the conclusion of the procurement process.
- In the case of projects where the public sector is the sole or main purchaser, the VFM undertaken at the end of the procurement process should comprise two key elements:
 - Monetary comparison – a comparison of the cost of the preferred Public Private Partnership tender, with the cost of traditional public sector procurement (the Financial Comparator), expressed in terms of discounted cashflows over the life of the PPP contract; and
 - Non-monetary comparison – a comparison of all the factors that are difficult to quantify in monetary terms, but their value to government and the wider public is significant. Examples include speed of project delivery, quality of service, and security of supply.
- One of the principles underlying PPPs is that risk should be allocated to the party best able to manage it. A detailed **risk assessment** should be undertaken for every PPP project.

- Central and Contracting Authorities will need to retain legal and financial advisers, as well as technical specialists, especially for Design, Build, Operate and Finance contracts and Concession contracts.

Policy Framework for Public Private Partnership (PPP) in Ireland: Project Implementation in the Local Government Sector, DOEHLG, Nov 2003

In 2003, the then Department of Environment, Heritage and Local Government published a policy framework document to guide the local government sector in the implementation of PPPs. The guidance highlighted the steps which all public projects must follow to ensure that the projects are properly examined and assessed, that the necessary statutory and administrative approvals are obtained, and that the procurement process is carried out in an efficient manner. It also highlighted the PPP specific tasks in relation to those steps, as follows:

- Project Identification – on the basis of an established business case/need for a project, the project receives the approval of a Sanctioning Authority. If a PPP approach is being considered some **market soundings** may be carried out to establish if there is market interest in the project.
- Option appraisal – during this phase various options for carrying out the project are examined, if the preferred option is a PPP, a PPP assessment report is completed which: determines the form the PPP will take; and establishes the **optimum allocation of risk** between public and private sector. Stakeholder consultation is carried out as part of a PPP Assessment Report. If the PPP procurement route is chosen, Department approval is sought before a Project Auditor is chosen, external advisors appointed, and a project steering group established.
- Statutory processes – the LA is responsible for preparing the project to go to procurement, including ensuring that the various planning and land acquisition and access consents are obtained.
- Pre-procurement - a **Public Service Benchmark (PSB)** cost is prepared, Departmental approval is sought for the project to go to procurement and an affordability cap is set based on the PSB.
- Procurement – the project is taken through the procurement process, when completed a tender recommendation report is submitted, and Departmental approval is sought to go to construction.
- Construction and operation – the contractor commences construction, variations may need to be referred to Department. When the LA is satisfied with the infrastructure provided, it signs off on the project and the operational contract commences.
- **Review of the PPP Process** – the performance of the project is reviewed
- Expiry of Contract

The Review of the PPP Process refers to the review of the performance of the project. As part of the policy framework document, the DOEHLG identified the objectives associated with the post project review of PPPs as follows:

- provide data on costs as an input to assessments (Public Sector Benchmarks) of subsequent PPP projects;
- provide public authorities with information on the economic benefits, or otherwise, of the PPP approach over alternative procurement approaches;
- identify the strengths and weaknesses in the systems in place for managing PPP projects.

It was noted that the Review of PPPs should contain the following:

- a brief description of the project;
- an outline of the project history with key decisions /events highlighted;
- a variance analysis of the final outturn costs of the project compared against initial estimates, the PSB, Affordability Cap and the Final Contract price;

- an analysis of the time taken to complete different stages of the project compared with projections; and
- the extraction of selected costs for the Department's database of costs on PPP projects.

Guidelines for the Provision of Infrastructure and Capital Investments through Public Private Partnerships: Procedures for the Assessment, Approval, Audit, and Procurement of Projects, 2006, Department of Finance

The Department of Finance (DOF) 2006 Guidelines for the Provision of Infrastructure and Capital Investments through Public Private Partnerships replaced Interim Guidelines published by the DOF in July 2003. The 2006 DOF Guidelines identified four distinct strands or functions associated with PPP projects as follows: the project appraisal function, the approval function, the procurement function and the audit function. Best practice would require an appropriate separation of functions between these strands.

1. The Sponsoring Agency is responsible for appraising projects. As part of the Detailed Appraisal, the Sponsoring Agency should determine the most appropriate procurement mechanism and, if a PPP approach is being considered, a PPP Procurement Assessment should be carried out.
2. Following appraisal of the proposed project, the Sponsoring Agency should approach the Sanctioning Authority for approval to proceed with the procurement of the project as a PPP.
3. PPP projects must be procured in line with all regulatory and EU procurement requirements in regard to tendering and bid evaluation.
4. There is a particular audit requirement in regard to PPP which is additional to the requirements outlined in the *Capital Appraisal Guidelines*, i.e. the appointment of a Process Auditor. A Process Auditor must be appointed for all PPP projects or grouped PPP projects where the capital cost is in excess of, or is likely to exceed, the limit specified by the Department of Finance (then €20 million).

Some of the key guidance points identified in the DOF 2006 Guidelines include:

- **Affordability:** A Sanctioning Authority should not allow a project to proceed unless it is satisfied that the overall capital cost of the project as a whole, including both PPP and non-PPP elements, can be accommodated within the Capital Envelope allocation(s) available to the Sponsoring Agency.
- **Value for Money:** VFM needs to be considered at two levels:
 - The overall VFM of the project – i.e. does the project as a whole offer good value for money; and
 - The VFM of the PPP contract – i.e. do the aspects of the project that are being procured by PPP represent good value for money, particularly when compared with the cost of achieving the same objective by traditional procurement (as represented by the Public Sector Benchmark (PSB)).

Four formal VFM tests should be carried out at the following points:

1. at PPP Procurement Assessment – a test carried out to determine whether, and in what form, a PPP arrangement has the potential to offer the best value for money solution for the procurement;
2. at Completion of the Public Sector Benchmark (PSB) – to determine whether, in light of the quantifications in the PSB, the conclusion reached in the PPP Procurement Assessment still holds;
3. at Tender Evaluation stage - to compare the highest ranking bid against the PSB, to assess whether the highest ranking bid offers a potential value for money solution; and
4. at Financial Close – a final test carried out (a) to assess the impact of any changes in the interest rate and/or discount rate and (b) where the project has been procured using the

Negotiated Procedure, to examine the effect of any proposed changes in the contract terms.

- The Sponsoring Agency should draw up a detailed **Output Specifications** for the project, focusing on outputs rather than inputs.
- A **Public Sector Benchmark (PSB)** - a comprehensive estimate of the cost (including risk valuations) of procuring those elements of the project that the private sector is to be invited to tender for in the PPP contract - is derived from the Output Specifications. The final PSB cost should be expressed in Net Present Value (NPV) terms, thereby reflecting the time value of money. The Output Specifications and PSB should be finalised and should be up to date before any tender invitations are issued.
- In any procurement competition, all of the tenders received are first examined to determine whether they are “suitable” bids. Having identified the highest ranking bid received, the next step is to examine the value for money of that bid.
- As part of a **Post Project Review** a comparison of the actual outturn costs of the project (as provided for in the contract) with the initial estimated costs (as set out in the PSB) should be undertaken and recorded. A Post Project Review aims to draw lessons for the future and, therefore, any significant lessons learned from the review should be translated into changes in the Sponsoring Agency’s project practices. Each Sponsoring Agency should maintain a cost database which should be used when benchmarking costs for future projects and in the compilation of future Public Sector Benchmarks. The post project review exercise should be used to inform and update this database with the latest available information. In addition, each sector should maintain a sector-specific risk database.
- In many instances, a PPP contract will include clauses that link payment to performance of specific obligations under the contract. In order to ensure that the full benefit is derived from these clauses, it is essential that the performance of the private sector partner is constantly monitored over the contract term and that these clauses are invoked, as appropriate.

Appendix B: Review of Components of Financial Comparator

As previously identified, the cost and revenue items comprising the net NRA costs under the PPP scenario were not determined by the NRA, rather they were determined by the PPP Concessionaire on the basis of the Concessionaire's own estimates of the costs and toll revenues they would likely incur in providing and maintaining the infrastructure. The analysis below is thus restricted to reviewing whether the costs and revenues comprising the Financial Comparator were reasonable approximations of the costs and revenues attributable to the NRA under a traditional procurement scenario.

There are three core elements comprising the net NRA costs associated with the traditional procurement (Financial Comparator) scenario. These are namely:

- overall construction, operational and lifecycle costs associated with constructing and operating the scheme (including the road and tolling facility);
- values assigned to the risks (both cost and revenue) assumed by the NRA; and
- the revenue from tolls.

The assumptions used in the VFM assessment with respect to each of these components are reviewed in Sections B1 – B3 below.

B1 Construction, O&M and Lifecycle Cost Estimates used in FC

The costs for each element as estimated in the original Financial Comparator (at ITN stage) are compared to the estimates provided preferred bidder in Table B1 below. this data includes risks

Table B1 – Base Tender Costs and per Pre-Tender Estimate (2006 prices)

	Capital Construction (€m)	O&M (€m)	Lifecycle (€m)	Other Costs (€m)	Total (€m)
Financial Comparator	377	140	69	72	658
Preferred Tenderer	332	171	39	105	647

Source: Limerick Tunnel PPP Scheme, VFM Report (August 2006) – Section 7.2

On the basis of the data provided in Table B1, it can be concluded that on aggregate, the overall cost estimates used in forming part of the Financial Comparator were in keeping with the tenders received being more expensive in capital and lifecycle costs but less expensive in O&M cost.

B2 Review of Risk Cost and Revenue Estimates in FC

Risk analysis formed an important element of the VFM assessment process. The approach to valuing of risk was based on a database of risk knowledge gained as part of the closing of three PPP deals, the preparation of five financial comparators for previous PPP schemes, as well as information emerging from NRA schemes procured using Design and Build methods. The approach used was to assign a generic range of probabilities to each major risk category (Capital, Operational, Lifecycle etc), on the basis of risk estimates from previous schemes. The probabilities were applied to the total cost estimates of each category to quantify the level of risk for the category as a whole.

Cost Risk

As set out in Table B2, the major cost risks retained by the NRA under the traditional procurement FC scenario related to: construction cost risks, operating cost risks, lifecycle cost risks and tolling cost risks.

The construction cost risks totalled €83.7m which is 20% of the base capital cost of road construction and 33% of the base capital cost of tunnel construction.

The operating cost risks totalled €5m which is 15% of the base operating cost of the roadway and 20% of the base operating cost of the tunnel.

The lifecycle cost risks totalled €6.4m which is 11% of the base lifecycle cost of the roadway road and 16% of the base lifecycle cost of the tunnel.

The tolling cost risks totalled €13.8m which is 10% of the toll related costs.

This additional risk premium associated with the tunnel elements is expected given the more complex nature of such elements.

The total cost risk value, which totalled €108.9m which is circa 21% of the total estimated scheme costs, is considered to represent a broadly standard estimation of cost risks.

Demand Risk

As part of the Financial Comparator, the forecast value of total Toll Revenue was estimated having recourse of the traffic forecasts. The value of demand risk is estimated based on 29% of Toll Revenue.

Table B2 – Overview of Cost Risks in Financial Comparator

Risk Category	Overview of Risk Type	Allocation of Risk	€m (% of Relevant Base Costs)	Total Risks
Capital	Risks relating to construction including roadway and tunnel	FC – all retained by NRA PPP – all transferred to PPP Co	83.7 (20% of base road construction costs & 33% of tunnel construction costs)	
Operating	Risks relating to operation and maintenance include the risks of estimation errors, service non availability, inflation, third party claims	FC – all retained by NRA PPP – all transferred to PPP Co	5.0 (15% of base road operating costs & 20% of tunnel operating costs)	
Lifecycle	Risks relating to a poorer than expected performance of key construction elements and/or materials	FC – all retained by NRA PPP – all transferred to PPP Co	6.4 (11 % of base road lifecycle costs & 16% of tunnel operating costs)	
Tolling	Risks relating to operating and lifecycle costs	FC – all retained by NRA PPP – all transferred to PPP Co	13.8 (10% of base tolling related costs)	
Total Cost Risk				108.9
Revenue	Risks relating to the uncertainty associated with the estimation of future traffic levels and violations/operational losses risk	FC – all retained by NRA PPP – transferred to PPP Co but subject to a traffic guarantee	157.2 (29% of total revenues)	
Total Revenue/Demand Risk				157.2

Source: Financial Comparator as shown in Value for Money Assessment, Limerick Tunnel PPP Scheme, March 2007

B3 Review of Toll Revenues in Financial Comparator

The key determinants of the estimated NRA toll revenues in the FC scenario were the forecast traffic volumes using the new dual carriageway infrastructure.

Traffic Volumes

Since the opening of the Limerick Tunnel PPP Scheme the traffic levels using the dual carriageway have been significantly below the levels forecast (circa 53%). Therefore, the realised toll revenue is likely to be below the forecast amount (which applied a risk factor of 29%).

Appendix C: Technical Note on Public Sector Benchmark

The following is an extract from the Technical Note on the compilation of a Public Sector Benchmark for a Public Private Partnership Project published by the Department of Public Expenditure and Reform which outlines current policy relating to disclosure of the Public Sector Benchmark.

“1.15 Disclosure of the Public Sector Benchmark

Current policy is that the PSB, or any elements thereof, is / are not made public during the tendering process on the basis that revealing the amount that the State is willing to pay may give tenderers an opportunity to increase their asking price above what they might otherwise seek. Where the public sector is likely to procure a similar project in the same or other sectors in the foreseeable future, the PSB (or any elements thereof) should not be released, even after the completion of the tendering process.

In the case of a once-off project, where it is not likely that there will be any similar procurement in the future, the release of the PSB after the contract has been signed could be considered, subject to the non-disclosure of risk valuations (see below). However, before releasing any of the PSB documentation, the Sponsoring Agency must be satisfied that none of the information being released could diminish the potential to secure value for money bids when procuring future projects.

If the Sponsoring Agency is satisfied that it is in order to disclose the PSB, it must advise the Sanctioning Authority of its intention to do so and of the basis for disclosure.

In no circumstances should the individual risk valuations set out in a PSB be disclosed and no information should be released in a format that would permit the identification of risk values. To do so would provide information on how the public sector values risk, which would prejudice the ability of the public sector to secure value for money in current and future projects through risk transfer. Similarly, it is important to ensure that information relating to the demand projections used in the development of a PSB for a Concession project (e.g., the Sponsoring Agency’s traffic forecasts for a toll road) is not disclosed.

Disclosure of any aspect of the PSB could have an adverse effect on the conduct by the Sponsoring Agency of PPP contract negotiations, particularly as information contained in the PSB could disclose positions taken in past or current negotiations and, indeed, positions that may be taken in future negotiations. Disclosure of the PSB, or elements thereof, may also give rise to an unwarranted loss to the Sponsoring Agency and/or an unwarranted gain to the private sector as access may be given to financial, commercial, industrial, scientific or technical information that belongs to the Sponsoring Agency.

The PSB, like other confidential and similar information relating to projects, is of course available to the Comptroller and Auditor General for inspection in connection with any reports his / her office may be progressing.”

Appendix D: Updated Cost Benefit Analysis

Limerick Southern Ring

Cost Benefit Analysis
January 2015

LIMERICK SOUTHERN RING ROAD CBA

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LIMERICK SOUTHERN RING ROAD CBA

FINAL REPORT

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1.0 Introduction

1.1 Overview

The Limerick Southern Ring Road and associated tunnel under the River Shannon was completed in July 2010. The Limerick Southern Ring Road scheme comprised the construction of approximately 9.75km of Dual Carriageway between the M7 / M20 Interchange at Rossbrien townland and the N18 / R445 Interchange to the east of Two Mile Inn townland. The scheme also included:

- The upgrade of the interchange at Rossbrien to a grade separated arrangement;
- The construction of a grade separated junction with the N69 in the vicinity of Bunlicky townland;
- The construction of 2.3km single carriageway link road from the Clonmacken Roundabout to the proposed scheme, this link road is tolled. A restricted grade separated junction was provided between the N18 and the link to the Clonmacken Roundabout; and
- The construction of a 0.7km tunnel under the River Shannon.

The Limerick Southern Ring Road scheme, as constructed in 2010, is shown in Figure 1 below.

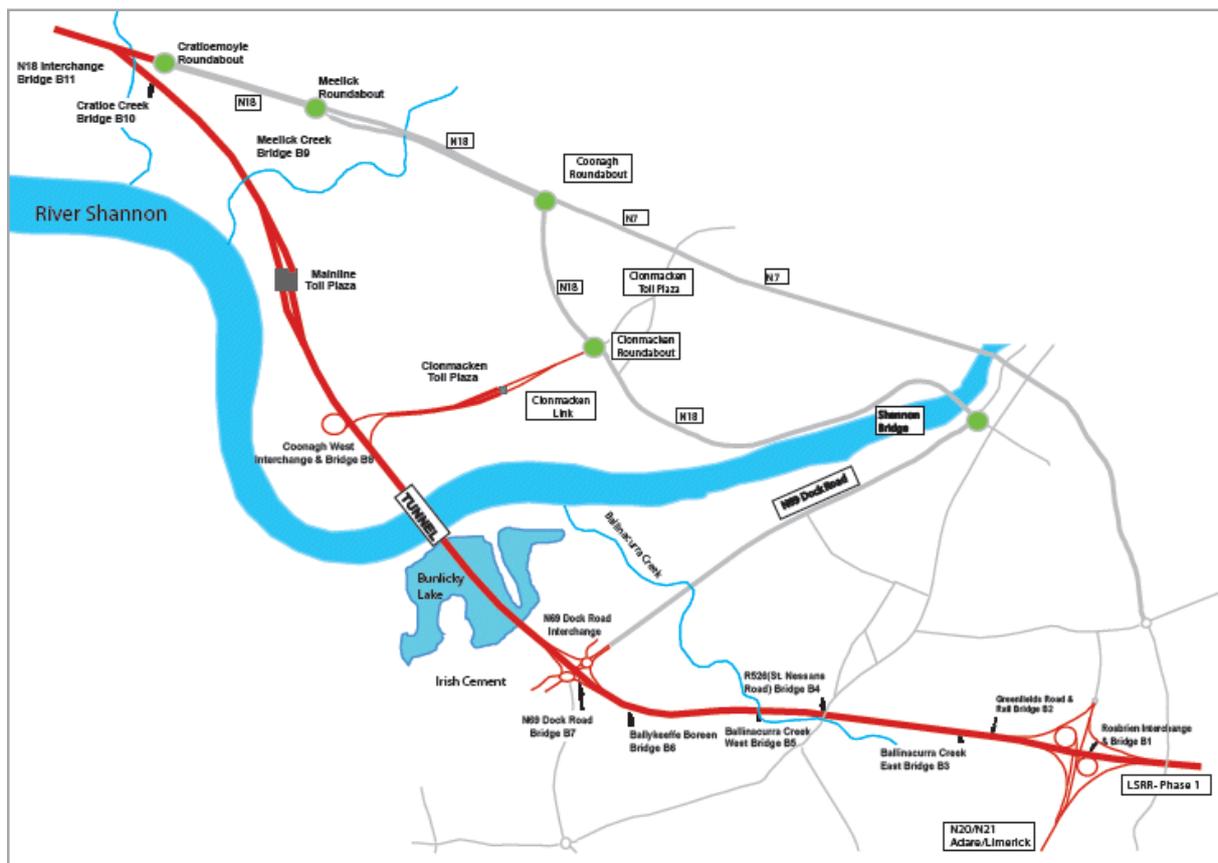


Figure 1: Limerick Southern Ring Road scheme

In 2004, a Cost Benefit Analysis (CBA) study was undertaken by Colin Buchanan and Partners in support of the subject scheme. This COBA assessment indicated that the proposed scheme would deliver a BCR of 4.73.

In the intervening period traffic flows on the N18 have been lower than forecast resulting in a shortfall in toll revenue to the PPP Company. This shortfall has led to Traffic Guarantee payment obligations on the Department of Transport, Tourism and Sport. As a result, the NRA has commissioned this study to retrospectively appraise the Benefit to Cost Ratio of the Limerick Southern Ring Road scheme taking account of actual traffic flows.

As part of the development of the recent 2014 Limerick HGV Study, AECOM developed a detailed base and forecast year transport models of Limerick City and environs, this model will form the basis for this assessment.

To this end, this report is broken down into the following sections:

- Transport modelling;
- Cost Benefit Analysis; and
- Results.

2.0 Transport Modelling

2.1 Introduction

The Limerick City Transport Models, developed as part of the Limerick HGV study, will be utilised in completing a CBA of the Limerick Southern Ring Road scheme. The Limerick City Transport Models have been developed within the transportation modelling software programme, VISUM (V13.00-06). The extents of the Limerick City Transport Models are shown in Figure 2 overleaf.

The models were originally developed in 2012 but have since been recalibrated to a base year of 2013 for the purpose of the Limerick HGV study. The models have been developed for the following time periods:

- AM Peak Hour (08:00–09:00); and
- Average Inter-peak Hour (10:00–16:00).

The development of the base year matrices and recalibration of the Limerick City Transport Models is described in the report Limerick HGV Study, Findings Report (Jan 2015) produced by AECOM on behalf of the NRA.

2.2 Network Development

Cost Benefit Analysis (CBA) forms one element of the appraisal process for road infrastructure projects. The benefits and costs of the proposed scheme are assessed using agreed NRA traffic growth scenarios. The CBA process compares the “Do-Minimum” scenario (i.e. not to progress with the scheme) with the “Do-Something” scenario (i.e. to progress with the scheme) and determines whether benefits resulting from the provision of the scheme will outweigh the costs of construction and future maintenance.

In this instance, the Do Minimum scenario represents the highway network prior to the opening of the Limerick Southern Ring Road whilst the Do Something network represents the network in its present form. Thus, the existing calibrated network as shown in Figure 2 below represents the Do Something scenario.

Using the Do Something network, the Do Minimum network was developed by removing the necessary road links from the existing network. A screenshot of the resultant Do Minimum model is shown in Figure 3 below. No further amendments were made to the model networks.

2.3 Demand

The cost benefit appraisal extends the calculation of benefits over a predetermined period, the NRA Project Appraisal Guidelines stipulate a 30 year period after opening. The assessment must take account of future traffic growth over the intervening period. The NTpM model has been used to produce central, high and low bound forecasts for the year 2033. Growth in the intervening years will be interpolated from the start (2013) and end years (2033).

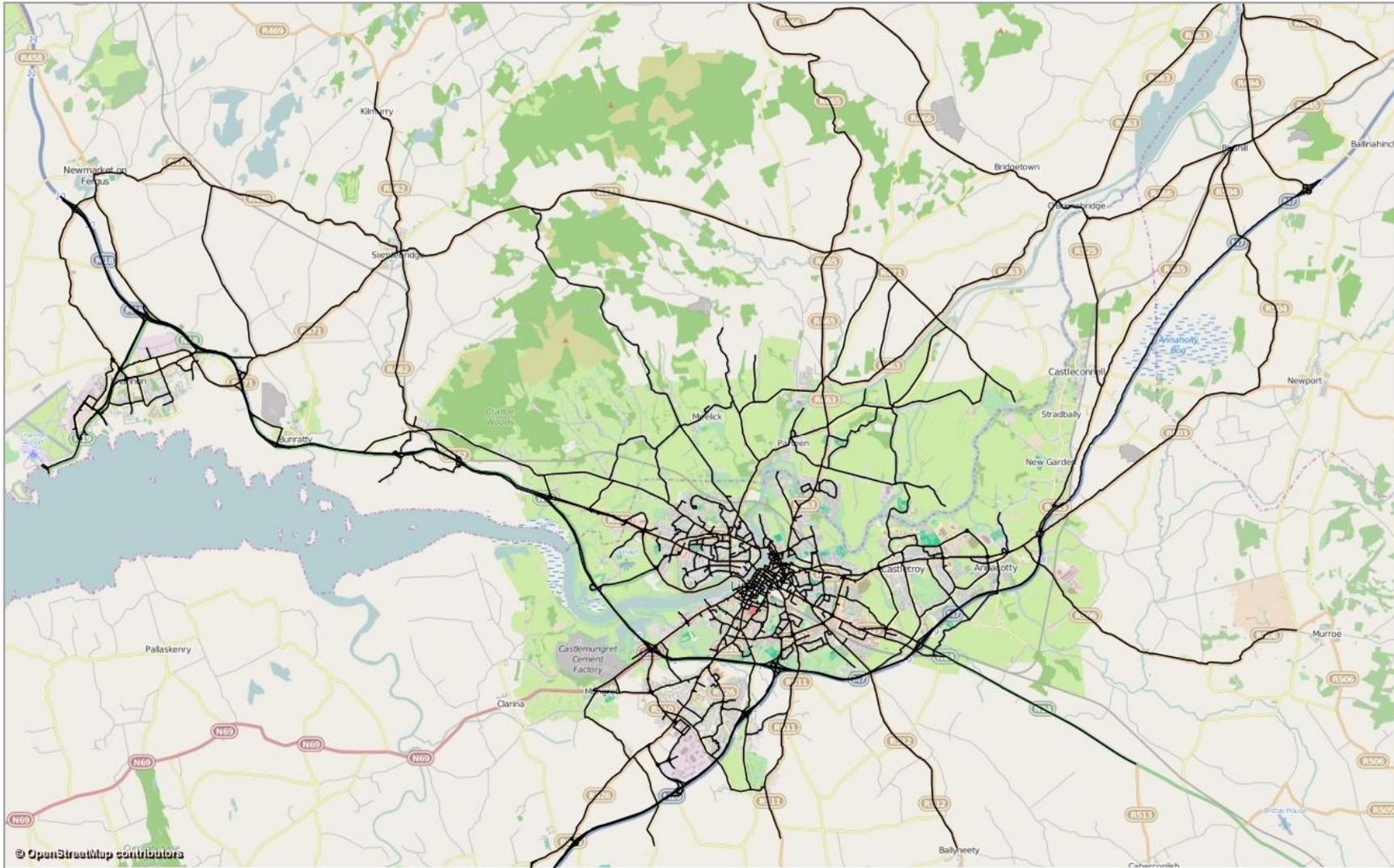


Figure 2: Extents of Limerick City Transport Models – Do Something

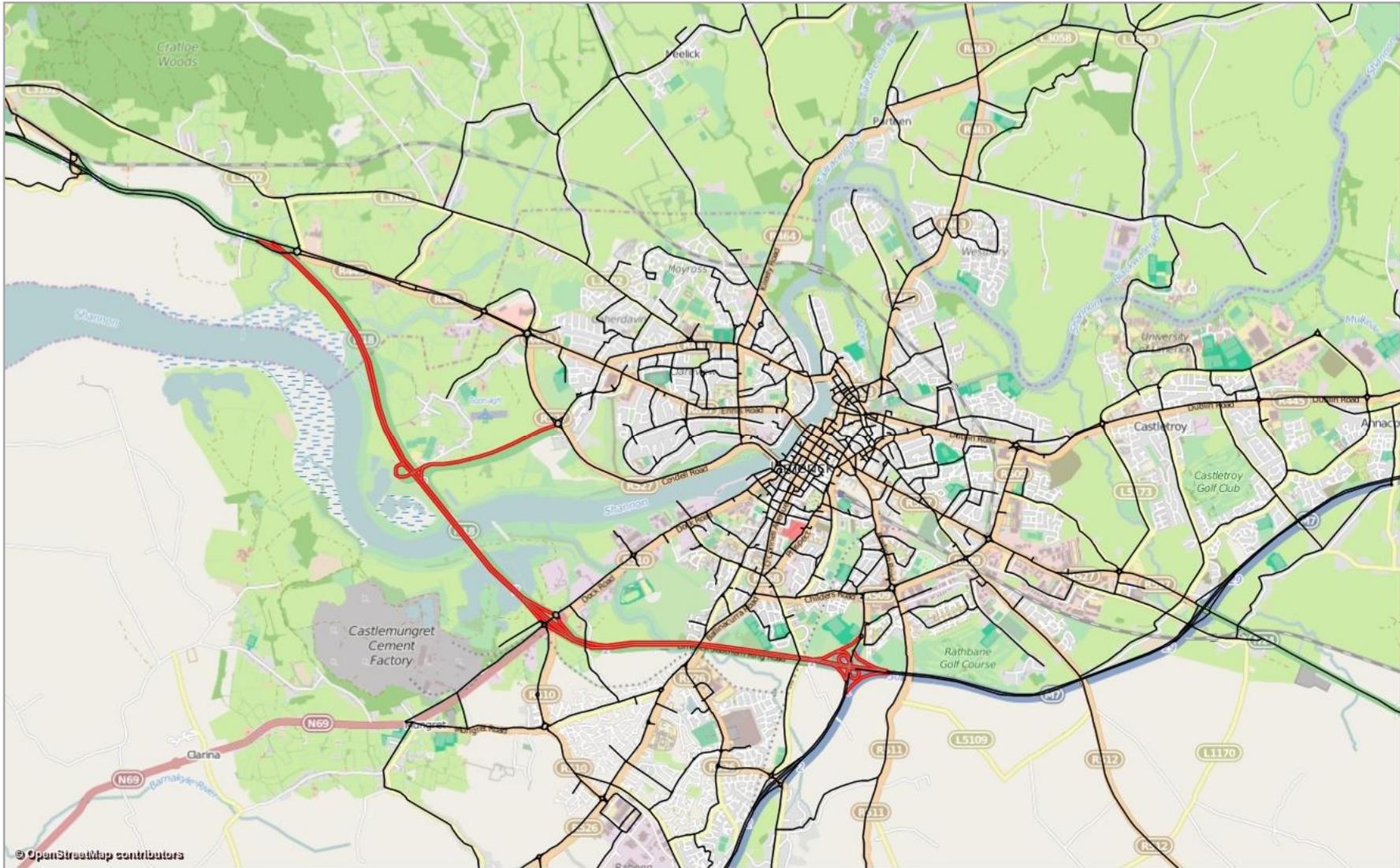


Figure 3: Section of Limerick Bypass removed to create Do Minimum network

2.4 Model Outputs

In order to identify the impacts of the Limerick Southern Ring Road scheme the changes in traffic flows at a number of key locations was extracted from the transport models.

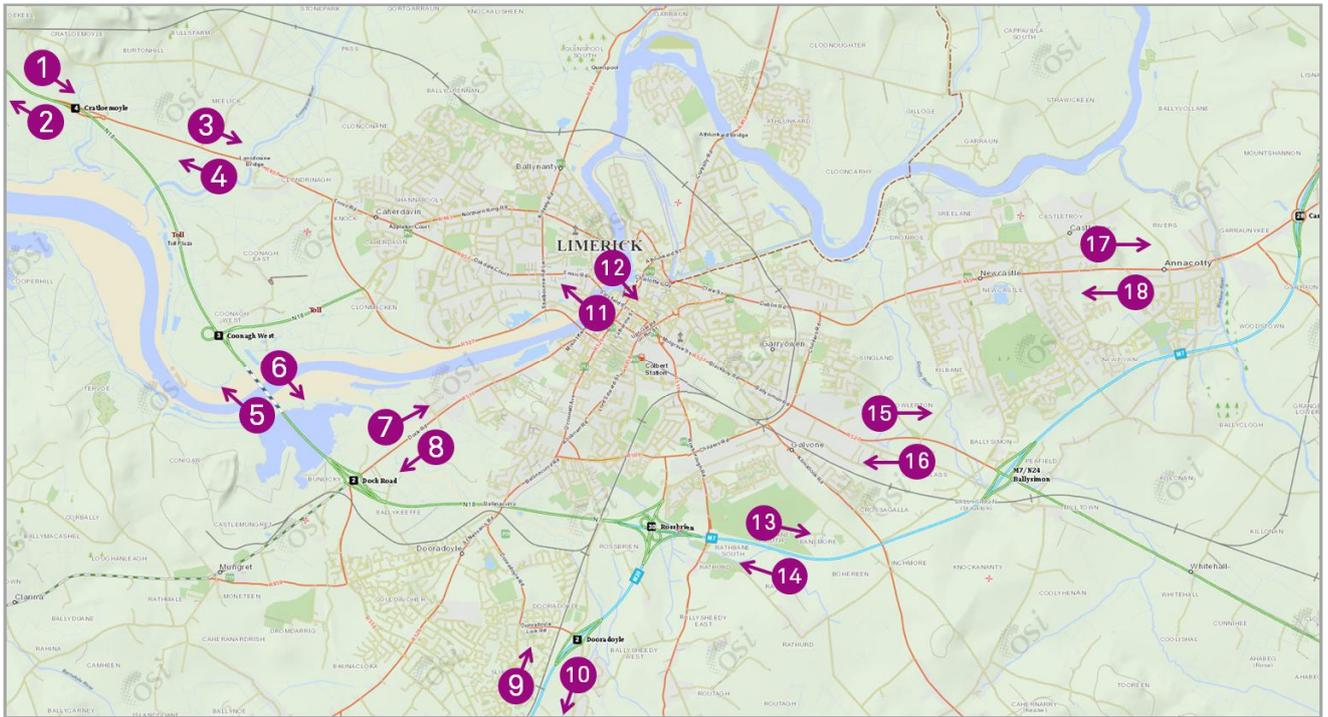


Figure 4: Traffic Volume Locations

The traffic flows during the AM peak hour at the above locations are outlined below for both 2013 and 2033.

Table 1: AM Traffic Flows

Location No.	Location	2013		2033	
		Do Minimum	Do Something	Do Minimum	Do Something
1	N18 at Cratloe	1,609	1,678	1,774	2,022
2	N18 at Cratloe	1,545	1,634	1,847	1,975
3	R445 at Two Mile Inn	1,609	1,030	1,774	1,248
4	R445 at Two Mile Inn	1,543	880	1,805	1,020
5	River Shannon Tunnel	NA	1,028	NA	1,417
6	River Shannon Tunnel	NA	744	NA	988
7	N69 Dock Road	1,105	1,017	1,303	1,145
8	N69 Dock Road	627	557	693	625
9	M20 at Dooradoyle	1,847	1,615	2,310	2,094
10	M20 at Dooradoyle	1,577	1,358	1,919	1,641
11	R857 River Shannon Crossing	585	495	664	563

12	R857 River Shannon Crossing	470	379	571	450
13	M7 East of M20 Interchange	1,033	1,725	1,297	2,144
14	M7 East of M20 Interchange	1,517	1,847	1,902	2,356
15	R527	563	398	555	484
16	R527	1,291	1,402	1,531	1,651
17	R445 at Annacotty	540	469	608	628
18	R445 at Annacotty	975	996	1,203	1,226

The above table highlights the significant impact the Limerick Southern Ring Road scheme has on city centre traffic volumes. The models show significant increases on the M7 East of M20 Interchange, as expected, in addition to reductions in traffic volumes on city centre links. In order to gain an understanding of global impacts the key performance statistics for the road network contained within the study area are presented below.

Table 2: AM Peak Hour Network Statistics

	2013		2033	
	Do Minimum	Do Something	Do Minimum	Do Something
Veh Km	176,865	183,382	215,082	226,955
% Change Veh Km	-	+3.9%	-	+5.5%
Veh Hours	5,235	4,594	7,410	6,412
% Change Veh Hours	-	-12.2%	-	-13.5%
Ave Speed (km/h)	33.8	39.9	29.0	35.4
% Change Ave Speed	-	+18%	-	+22%

Table 3: Interpeak Peak Hour Network Statistics

	2013		2033	
	Do Minimum	Do Something	Do Minimum	Do Something
Veh Km	120,721	121,779	138,730	140,614
% Change Veh Km	-	+1%	-	+1.4%
Veh Hours	3,200	2,948	3,822	3,441
% Change Veh Hours	-	-7.9%	-	-10%
Ave Speed (km/h)	37.7	41.3	36.3	40.9
% Change Ave Speed	-	+9.5%	-	+12.7%

3.0 Cost Benefit Analysis

3.1 Approach

This section of the report outlines and discusses the analysis tools used to inform the CBA. Two models are used to inform the CBA as follows:

- Economic Analysis – TUBA Model; and
- Road Safety Analysis – Collision Reduction Model.

Economic Analysis

Within the Economic Analysis model, the Transport User Benefit User Analysis (TUBA) v1.9 computer program has been used to assess the impacts of the scheme on travel times and vehicle operating costs. The CBA assessment uses a Discount Rate of 4%, with all costs and benefits discounted back to a common base year of 2009. The analysis has been carried out in accordance with *NRA PAG Unit 5.6: Guidance on Using TUBA*. Costs and benefits have been analysed over a fixed 30 year period in accordance with standard NRA procedures as outlined in the PAG.

TUBA uses trip matrices (demand) and travel cost skims (time, distance and tolls) extracted directly from the transport models of the proposed scheme to calculate user benefits. Therefore no additional data was required in order to develop the TUBA model. Reference should be made to the Limerick HGV Study, Findings Report (January 2015) for details of data collected as part of the development of the traffic model.

Road Safety Analysis

The CBA program TUBA does not calculate safety benefits. Therefore an assessment of potential safety benefits has been undertaken using a bespoke spreadsheet based collision reduction model. The collision reduction model utilised data from the transport models and collision parameters from the *NRA PAG Unit 6.11: National Parameter Values Sheet*. Further detail on the Road Safety Analysis methodology is provided in the following sections of the report.

The results from the both the Economic and Road Safety Analyses are combined to produce the overall benefits for the subject scheme.

3.2 Scheme Costs

Scheme costs were provided for the original COBA assessment in 2004 and are reported in the COBA Analysis Report for the scheme. As per the Common Appraisal Framework and PAG, all costs and benefits are required to be expressed in 2009 values. Therefore the 2004 costs have been factored to 2009 values using the CSO Consumer Price Index. The breakdown of these costs is presented in Table 4 below. It should be noted that these prices are factor prices exclusive of VAT.

Table 4: Construction costs (2004 prices)

Item	Cost (€ million)
Land acquisition	48.4
Construction	274.3
Design and Admin	18.7
Total	341.4

Within the original COBA assessment, construction was assumed to be carried out over a period of 4 years, with the cost broken down as shown in Table 5 below.

Table 5: Time Breakdown of Construction Costs

Year	Construction/design	Land
1	20%	100%
2	30%	-
3	30%	-
4	20%	-

3.3 TUBA

3.3.1 Inputs

TUBA uses trip matrices (demand) and travel cost skims on a zone to zone basis (time, distance and tolls) extracted directly from the 2013 and 2033 AM peak and Inter Peak traffic models of the proposed scheme to calculate user benefits. Within the subject assessment the following demand segments will be utilised:

- Light Vehicles;
- Medium goods vehicles (OGV1); and
- Heavy goods vehicles (OGV2).

All traffic based inputs have been sourced from the Limerick City Transport Models which were recalibrated to a 2013 reflection.

Economic parameters are sourced from the NRA Project Appraisal Guidelines (PAG). All general parameters such as value of time, value of time growth rates, discount rates, fuel cost changes, fuel consumption, vehicle operating costs fuel/non fuel, trip purpose distribution, tax rates, change in tax rates, vehicle occupancy rates and vehicle proportions were taken from the *NRA PAG Unit 6.11 - National Parameters Value Sheets*. Each of these parameters is input into TUBA by a standard text file.

Fuel efficiency was taken from UK WebTAG guidance as no guidance is currently available in Ireland. Fleet fuel type proportions were available from the Department of Environment; the proportions are given in Table 6 below. The forecast changes to fleet fuel type were taken from WebTAG as set out in Table 7. Data on fuel costs, duty and VAT is provided in Table 8.

Table 6 - Car Fleet Fuel Type Split

Year	Petrol	Diesel
2009	77.6%	22.4%

Table 7 - Forecast Change in Car Fleet Fuel Type Split

Start Year	End Year	Vehicle Type	% Change Petrol
2010	2010	1 - Car	-2.4
2011	2025	1 - Car	-1.27
2026	2080	1 - Car	0.00

Table 8 - Fuel Costs

Fuel Type	Resource Cost (cents/L)	Duty (cents/l)	Vat (%)	Carbon (grams/L)
Petrol	44.76	50.88	21.5	627.57
Diesel	44.51	40.91	21.5	717.15

*VAT increased to 23% as and from 1st January 2012

3.3.2 Development of Annualisation Factors

Annualisation factors are used to convert the benefits from the modelled time periods to annual benefits. The benefits in each modelled time period are multiplied by the annualisation factor and then summed to give annual benefits.

The annualisation factor used to convert AM peak hour benefits to annual benefits is 253 working days whilst Inter peak benefits are reflective of conditions 7 days a week so utilise an annualisation factor of 365. In addition to the annualisation factor a 'daily' factor was applied to the benefits estimated for each of the modelled peak hours which reflected the frequency with which traffic conditions similar to those modelled in each peak hour occur on the network. The resultant formula for converting modelled benefits in each peak hour to an annualised figure is outlined below:

$$\text{Modelled Hour Benefits} * \text{Factor Daily} * \text{Annualisation Factor} = \text{Annual Benefits}$$

The calculation of annual benefits for each modelled hour was as follows:

- AM Peak Benefits * 253 * 4 = Annual AM & PM Peak Benefits
- Average Inter Peak Benefits * 365 * 8 = Annual Average Inter Peak Benefits.

The traffic models only cover the AM Peak hour (08:00 – 9:00) and average Inter Peak hour (10:00 – 16:00). Daily factors reflecting the number of hours during which traffic conditions similar to those in the modelled peak hours are encountered on the modelled network were developed based on the daily profile of traffic distribution on a number of key links within the study areas as indicated in Figure 5 below.

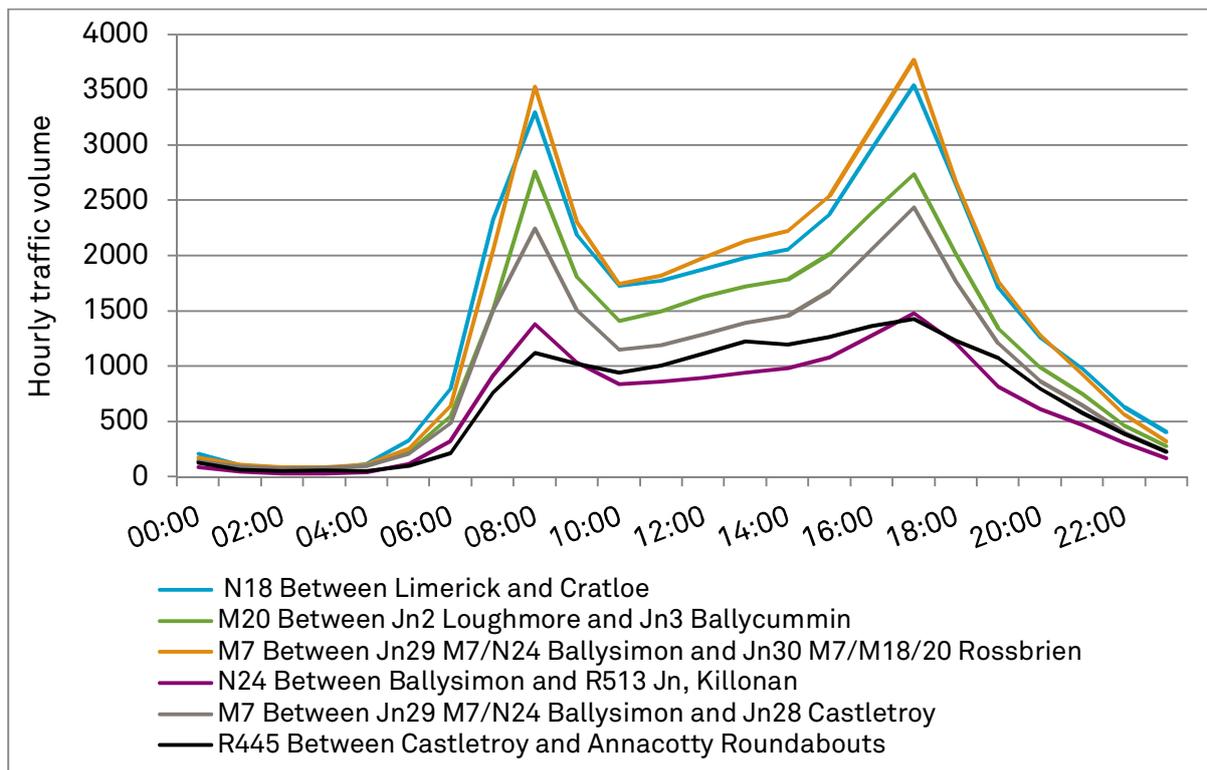


Figure 5: Sample of Data used in the Development of Annualisation Factors

As can be seen in Figure 4 above, AM Peak type conditions occur twice on the network during the AM and PM periods respectively, a daily factor of 4 was therefore applied to the AM Peak Benefits. Inter Peak conditions occur approximately eight times (at a minimum) respectively on the network therefore a daily factor of 8 was applied to the Inter Peak benefits. Inter peak conditions are assumed to occur for a further 8 hours on each weekend day, thus the inter peak conditions were used to represent all 365 days of the year as outlined above.

Due to significantly lower traffic volumes during the Off-Peak Hours (19:00 – 07:00), benefits during these hours are negligible, and are therefore not accounted for. The resultant annualisation factors are summarised in Table 9 below.

Table 9: Annualisation Factors

Period	Hours/Year
AM Peak	1,012
Inter Peak	2,920

3.4 Incident Analysis

3.4.1 Methodology

The investigation of the impact of the scheme on incident numbers was undertaken using a spreadsheet analysis based on the approach previously adopted by the COBA program.

This process involved allocating each link in the VISUM network to one of the link types referred to in PAG Unit 6.11 for which incident rates are calculated. The allocation is based

on the standard, speed limit and location (split by urban and rural) of each link. Traffic volumes were then summed over these link types to obtain total vehicle kilometres by link type for the Do Minimum and Do Something scenarios. Vehicle kilometres were converted to incident numbers using the rates given in PAG Unit 6.11 for Do Minimum and Do Something scenarios and annualised using the same factors used for TUBA.

The analysis was extended to 30 years interpolating between the modelled years and assuming no further growth beyond the final modelled year.

Incident costs were derived from those included in PAG Unit 6.11, National Parameter Values Sheet. Values were discounted to the 2009 base year.

3.4.2 Collision Benefits

Over the 30 year analysis period the calculations showed that the scheme would result in an overall reduction of 140 incidents. Of these the severity breakdown was:

- Fatal 8
- Serious 17
- Minor 115

The corresponding reduction in casualties is set out below.

- Fatal 9
- Serious 24
- Minor 58

The cost savings as a result would be €26.6 million in 2009 prices and values.

4.0 Results

4.1 Assessment result

This section presents the results of the reassessment of the cost benefit analysis for the Limerick Southern Ring Road scheme. The results are based upon the annualisation factors outlined in Section 3 above. The results also take into account scheme collision reduction benefits.

The full results are presented in the form of the Transport Economic and Efficiency Table, presented in Appendix A of this report. The overall analysis of monetised costs and benefits is shown in Table 10 immediately below.

Table 10: Analysis of Monetised Costs and Benefits

Item	€000s
Greenhouse gases	48
Economic Efficiency - consumer users (commuting)	193,972
Economic Efficiency - consumer users (others)	274,478
Economic Efficiency - business users and providers	247,671
Accidents	26,616
Wider public finance (indirect tax revenue)	-22,932
Present Value of Benefits (PVB)	719,853
<i>Broad Transport Budget</i>	
Central government investment costs	384,663
Central government revenue	-165,184
Present Value of costs (PVC)	219,499
<i>Overall Impacts</i>	
Net present value (NPV)	500,354
Benefit to Cost ratio	3.3

All values are in 2009 prices and values.

4.2 Discussion

The recent analysis returns a lower BCR than the original cost benefit analysis, 3.3 against 4.7. There are a number of potential reasons for this; however the main reasons may be the significantly lower levels of traffic using the scheme compared to previous forecasts in addition to the differing approaches to the modelling used as part of the analysis.

The original assessment used the COBA program to calculate the changes in travel times and delays between the Do Minimum and Do something scenarios. The Economics Report draws attention to the fact that COBA was apparently significantly overestimating delays at some junctions, when compared to those produced by the traffic model. A delay cap was introduced to alleviate this issue; however it is possible that the COBA model continued to overestimate Do Minimum delay in the city centre.

For the new assessment reported here times and delays in the network are all calculated within the traffic model. The VISUM platform used does not provide very detailed junction delay modelling. Consequently Do Minimum delays in the City centre may be lower than those used in the original assessment, and where the original assessment probably overestimated delay the new assessment may underestimate delay.

In addition there are a wide range of elements in the scope of the modelling that would lead to differences between the results including the scale and scope of the network and the traffic demands included. Additionally economic parameters, in terms of values of time and vehicle operating costs have changed as have growth factors.

Given the range of differences between the two assessments we would conclude that the new analysis demonstrates that the findings of the initial analysis were realistic and that in retrospect the scheme continues to provide a robust return in terms of BCR.

Appendix A

Economic Efficiency of the Transport System (TEE)

Non-business: Commuting	ALL MODES	ROAD	
<u>User benefits</u>	TOTAL	Private Cars and LGVs	
Travel time	243287	243287	
Vehicle operating costs	1977	1977	
User charges	-51292	-51292	
During Construction & Maintenance	0	0	
NET NON-BUSINESS BENEFITS: COMMUTING	193972	(1a)	193972
Non-business: Other	ALL MODES	ROAD	
<u>User benefits</u>	TOTAL	Private Cars and LGVs	
Travel time	326992	326992	
Vehicle operating costs	2102	2102	
User charges	-54616	-54616	
During Construction & Maintenance	0	0	
NET NON-BUSINESS BENEFITS: OTHER	274478	(1b)	274478
Business		Goods Vehicles	Business Cars & LGVs
<u>User benefits</u>			
Travel time	269708	92831	176877
Vehicle operating costs	16994	16524	470
User charges	-39031	-24027	-15004
During Construction & Maintenance	0		
Subtotal	247671	85328	162343
Private sector provider impacts			
Revenue			
Operating costs			
Investment costs			
Grant/subsidy			
Subtotal			
		(3)	
Other business impacts			
Developer contributions		(4)	
NET BUSINESS IMPACT	247671		(5) = (2) + (3) + (4)
TOTAL			
Present Value of Transport Economic Efficiency Benefits (TEE)	716121		(6) = (1a) + (1b) + (5)

Notes: Benefits appear as positive numbers, while costs appear as negative
All entries are discounted present values, in 2010 prices and values



N25 Waterford Bypass Post Project Review

December 2012
National Roads Authority

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National Roads Authority

St Martin's House, Waterloo Road, Dublin 4

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Executive Summary

This Post Project Review has been prepared at the request of the National Roads Authority, and is generally in accordance with the NRA Project Appraisal Guidelines 2011. It is noted that the N25 Waterford Bypass project progressed through the initial project planning, route selection, preliminary design and statutory process prior to the introduction of the NRA Project Management Guidelines and NRA Project Appraisal Guidelines. In this regard traffic modelling and project appraisal was undertaken under the direction of a Steering Committee comprising the three Local Authorities and the National Roads Authority.

The purpose of this Review is to confirm the following;

- That the basis on which the project was undertaken was correct,
- That the expected benefits and outcomes materialised,
- That the planned outcomes were the appropriate responses to actual public needs,
- That the appraisal and management procedures adopted were satisfactory, and
- If conclusions can be drawn which are applicable to the project, the ongoing use of the asset, or to associated policies.

This review reiterates the need for the scheme and its key objectives, verifies that the specified objectives have been delivered, and confirms that the project has been successfully completed.

The N25 Waterford Bypass was procured by Public Private Partnership (PPP) and has a concession period of 30 years expiring in April 2036. The Contractor's Design and Construction element of the Works commenced in April 2006 and reached Permit to Use (scheme opening) in October 2009. Responsibility for the Operation and Maintenance of the Project Road element of the Works lies with the concession company Celtic Roads Group (Waterford) Limited for the remainder of the concession period. Handback of non Project Road elements of the Works to the relevant Local Authorities, which commenced in October 2009, is subject to a defects period of 5 years post Completion and which runs until July 2015.

The Scheme is currently at Handover, Review and Closeout stage (Phase 7 PMG 2010).

1. Background to the Project

1.1 Introduction

The N25 Waterford City Bypass (NRA Ref: WB/99/110) comprises 16.3 km of dual carriageway bypassing Waterford City, 9.5 km of major link roads and an additional 13 km of side roads and minor realignments. It includes a 465 metre long dual carriageway cable-stayed bridge over the River Suir (with a 230m main span), a number of major viaducts, two grade separated interchanges, along with a number of bridges and major culverts giving an overall total of approximately 60 principal structures.

The N25 Waterford Bypass was procured by Public Private Partnership (PPP) and has a concession period of 30 years expiring in April 2036.

1.2 Need for Scheme

The need for a second river crossing of the River Suir in Waterford as well as improvements to the approach road network had been a long term objective of Waterford City Council, Waterford County Council and Kilkenny County Council, and was included in all City and County Development plans since the mid 1960's.

The publication of the NRA's National Roads Needs Study in 1998 established an objective to provide, as a minimum, a Level of Service (LOS) D. This is equivalent to an average inter-urban journey speed of 80kph. The National Roads Needs Study identified that several approach roads in the environs of Waterford, the N24 and N9 to the north east of the city as well as a section of the existing N25 to the west towards Kilmeaden had a LOS E (equivalent to an average inter-urban journey speed of 72 kph), prior to opening of the bypass. The National Roads Needs Study also identified that without future improvements and with continued traffic growth, the entire rural element of the existing N25 through south Kilkenny and Waterford would see the LOS deteriorate to Level E and in some cases Level F with average speeds below 72 kph with 'platoon' type flow dominating. The following was predicted for 2019, the design year for the National Roads Needs Study:

- The N25 between Kilmeaden and Waterford would have an AADT of between 15,500 and 23,000 resulting in a LOS of E or F;
- The N25 between Waterford and New Ross would have an AADT of 15,000 resulting in a LOS of D/E;
- The N9 between Waterford and N24 Junction would have an AADT of 33,000 resulting in a LOS of F.

The 20km section of N25 National road passing through Waterford City, prior to the construction and opening of the N25 Waterford City Bypass comprised the following:

- 3.8 km of wide single carriageway
- 1.2 km of single carriageway
- 1.3 km of urban dual carriageway
- 6.2 km of single carriageway through city streets
- 7.5 km of mixed single and wide single carriageway.

Furthermore this 20 km section included 10 traffic signal controlled junctions, 8 signal controlled pedestrian crossing points and over 60 at grade uncontrolled junctions.

In 2006, the average journey time for this 20 km section was approximately 20-25 minutes during off peak times, with times of 35-40 minutes not uncommon during peak commuting times (8am to 9am and 4.30pm to 6.30pm).

Traffic counts using the N25 through Waterford City prior to construction of the Bypass (based on data from the counter on the existing Rice Bridge over the period 2000 to 2006) peaked at an Average Daily Volume of 42,373 in May 2006.

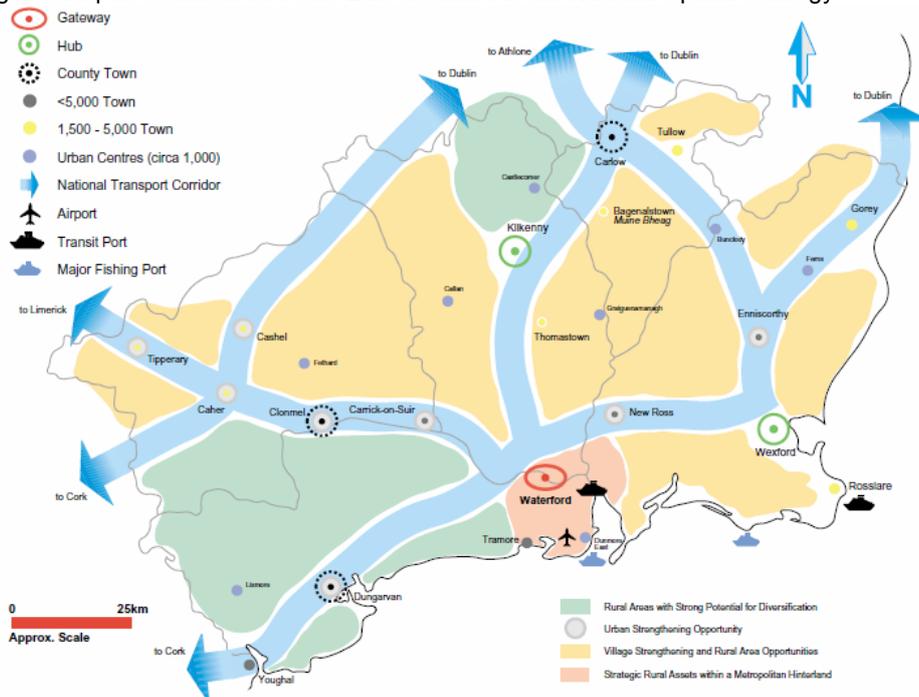
1.3 Strategic Fit

The project was developed from Initial Project Planning through Route Selection, Project Appraisal and Statutory Process under the direction of a Steering Committee comprising the three Local Authorities and the National Roads Authority, to ensure consistency and compatibility with contemporaneous national policy documents, including the National Roads Needs Study and the National Development Plan 2000-2006 (NDP) which was in preparation during Route Selection. It is noted that the N25 Waterford Bypass project progressed through the initial project planning, route selection, preliminary design and statutory process prior to the introduction of the NRA Project Management Guidelines (published in March 2000) and NRA Project Appraisal Guidelines (published in March 2008).

The NDP identified a significant national infrastructure deficit that threatened the economic and employment potential of the country, and proposed extensive improvements to the national primary routes, including the N25 as a key economic link between the two major sea ports at Rosslare and Cork. The project was considered to support these objectives by providing the necessary improvements and capacity to ensure the future level of service on the route.

Waterford was subsequently identified in the National Spatial Strategy NSS 2002-2020 as a regional Gateway and the N25 as a strategic national transport corridor (refer to figure 1 below). The project is therefore considered to have supported the objectives of the NSS by significantly contributing to the improvement of the strategic corridor, and improving access to the strategic gateway.

Figure 1: Strategic Transport Corridors in South East identified in the National Spatial Strategy



Source: National Spatial Strategy

1.4 Project Objectives

The key objectives of the project were as outlined below:

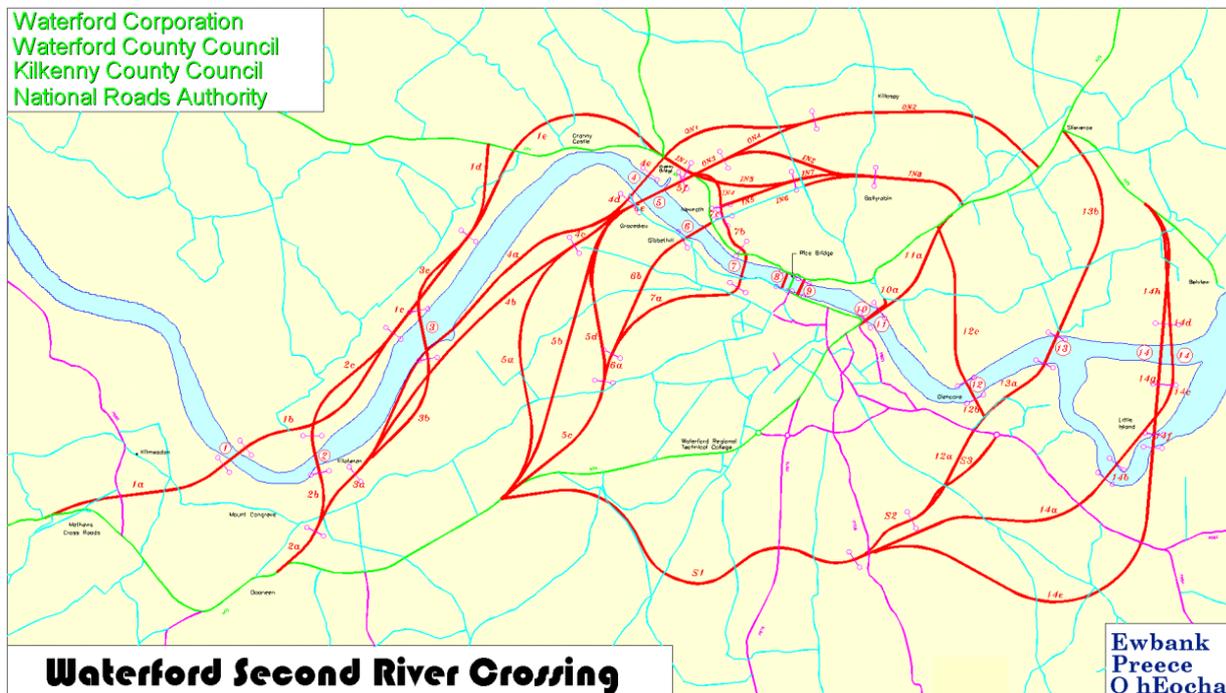
- Provision of a second River Suir Crossing at Waterford, a long time objective of Waterford City Council, Waterford County Council and Kilkenny County Council.
- Improvements to the approach roads to Waterford City from South Kilkenny (N9/N10) and from Cork/Dungarvan (N25).
- Improvements to journey times between Rosslare and Cork.
- Reduction in traffic volumes in particular HGV's along Waterford's congested quays.
- Protect the natural and built environment, by avoiding where possible or reducing direct and indirect impacts on the environment of both users and non-users.
- Improve access and amenity for local communities by separating interurban and local traffic and removing interurban traffic from community centres.
- Provide a solution to the above objectives in a manner that demonstrates 'value for money' for the resources allocated to it.
- Provide a solution that improves the safety standard and accident record of the existing road.

2. Project Planning

2.1 Traffic Analysis and Forecasting

Between 1996 and 1997, a feasibility study was carried out by Mott MacDonald (then known as Ewbank Preece OhEocha), on behalf of Waterford Corporation (now Waterford City Council) to examine the need for, and potential type and location of, a second river crossing and associated roads at Waterford together with the evaluation and quantification of associated costs and benefits. A comprehensive set of alternative crossings and road networks were developed and examined in terms of traffic performance, return on investment and environmental impacts (Refer to Figure 2).

Figure 2



The DELTRAN suite of computerised transportation behavioural traffic modelling programmes was used to establish a mathematical model of traffic and its behaviour in Waterford. The study indicated off-peak volume/capacity ratios (congestion levels) in 2016 would exceed 1994 peak hour values, and in the peak hour the whole city south of the river would have reached its maximum working capacity with a mean area-wide traffic speed of 21 kph (13mph). These whole-area statistics mask even less tolerable situations on some individual roads including:

- Rice Bridge, the R686 route from Ash Road to Bridge Street, Brown's Road, Dunmore Road, Inner Ring Road, The Mall, and the N9 between Newrath and Granny Bridge, all of which would be overloaded and congested throughout the day, and
- John Street, The Quays, Southern Ring Road, and Cork Road, which would be overloaded and congested during peak hours.

Predicted traffic volumes are included in section 4.2 of this report.

2.2 Project Appraisal

The computerised mathematical model of traffic behaviour, described in item 2.1, was used to produce forecasts of the study area traffic conditions that might be associated with each of the road networks tested. For each network, separate forecasts were made for an evening peak hour and a typical off-peak hour, for each of the years 2006 & 2016. These forecasts enabled assessments to be made of the economic benefit, and the traffic and residual congestion implications of each alternative network. Comparison was made with a 'do nothing' base network. This network included road improvements that were already in physical or administrative progress, i.e. known schemes that will be implemented but were not yet in place. The economic benefits, together with capital costs, enabled the economic rate of return to be calculated and a ranking order of possible schemes to be prepared.

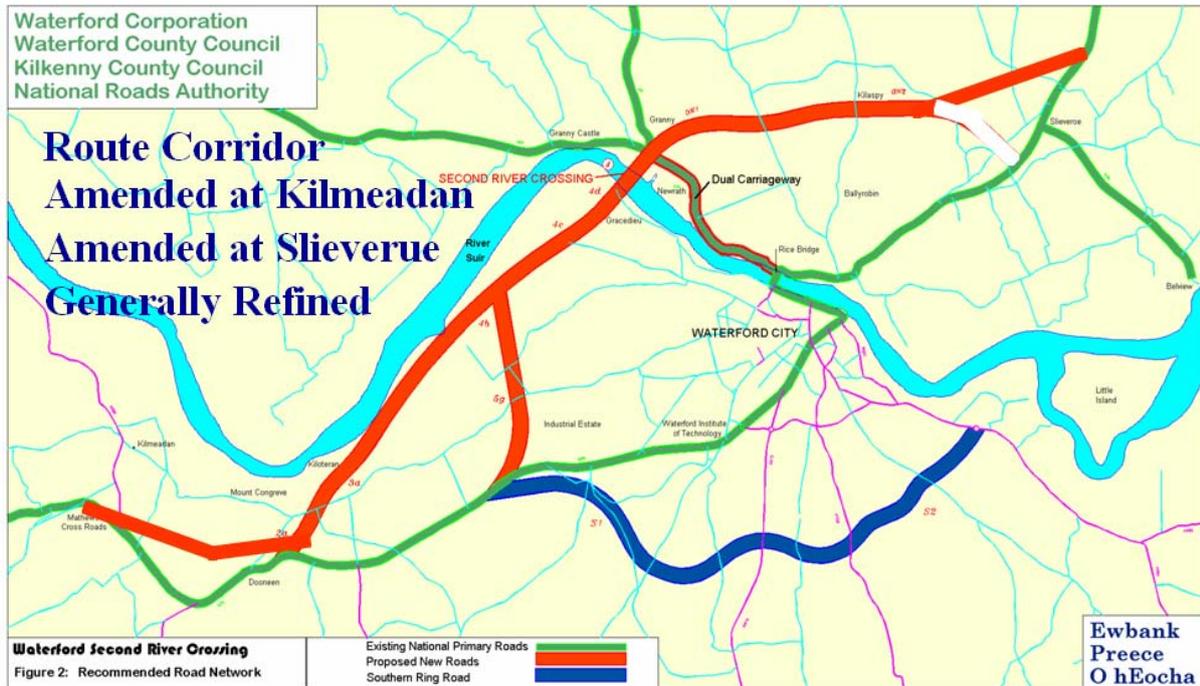
The need for a Second River Crossing & Bypass was clearly established having regard to traffic performance, benefits and economic return. Having assessed and evaluated a large number of networks a recommended road network was selected, taking account of economic rate of return, Waterford City traffic performance, National Primary Route traffic performance, outline environmental examination, and the projected development of Waterford City and environs. The recommended scheme had an internal rate of return of around 20% which confirmed the need for the scheme. This internal rate of return was presented in both the Feasibility Study and at the 2001 oral hearing

The selected network comprised:

- a new road bridge across the Suir between Gracedieu and Grannagh,
- a new approach road to the south end of the bridge from the N25 at Dooneen (subsequently extended to Mathews Cross to bypass Kilmeadan), with an intermediate access near Knockhouse Upper,
- an at-grade link road from the Knockhouse Upper interchange to the Cork Road/Southern Ring Road intersection, with intermediate access as required in the context of planning for the area,
- a Northern Ring Road, connecting the N9/N24 intersection at Grannagh with the N25 beyond Slieverue,
- dualling of Newrath Road (existing N9) between Grannagh and the end of the Sallypark improvement,
- construction of a grade-separated interchange near Grannagh to interconnect the N9, N24, bridge approach road, Northern Ring Road, and improved Newrath Road.

The separate completion of the Southern Ring Road was also envisaged. The recommended road network indicated a corridor which was to be further refined in the course of the preparation of the Route Selection Report. Subsequent to the publishing of the Waterford Second River Crossing Feasibility Study Report, a decision was taken to extend the Waterford Bypass by adding a bypass of Kilmeadan. This decision was taken in view of the poor standard of the existing approach through Kilmeadan to the proposed bypass. The scheme was also extended at the northern end. (Refer to Figure 3)

Figure 3



2.3 Route Selection

The Route selection and subsequent stages were carried out by a combined team of Tramore House Regional Design Office and Mott MacDonald. The study area was divided into four sections to permit effective comparison of route options, namely the Kilmeadan section, the Western section, the Suir Crossing section, and the Northern section.

For the Kilmeadan section nine route options were considered during the route selection process. Principal constraints in this section were impacts on the local communities and the presence of Mount Congreve gardens, which are of international importance. During the early months of 2003 as part of the advance Archaeological Investigations, a Viking Site was discovered at Woodstown. The site was deemed to be of national importance and resulted in the selection of an alternative route for approximately 3.5 km of the western end of the scheme to facilitate the preservation of the site 'insitu'.

For the Western section one route option was considered incorporating the proposed N25 between the Kilmeadan and Suir Crossing sections and the Western Link. There were few environmental or engineering constraints on this section, and those were common to all possible route options or could be mitigated.

For the Suir Crossing Section three horizontal alignment options and five vertical alignment options were assessed. This section includes the connection of the N9 and the N24 to the N25 north of the river. Due to the engineering considerations and the large number of environmental constraints in the area it was not possible to select a route which avoided significant potential environmental impacts. The preferred route has significant potential impacts on a proposed Natural Heritage Area and a protected plant species. Consequently, a detailed mitigation/compensation strategy was developed in consultation with the National Parks and Wildlife Service.

For the Northern section three route options were considered. As there were few environmental constraints on this section the selected option was chosen to bypass the village of Slieverue, and to provide the best tie in to the N29 Port Road and to provide continuity of alignment to the existing N25 at the eastern end of the scheme.

As the Project Appraisal Guidelines were not in place during the Route Selection Phase, the design team consulted closely with the NRA to ensure that the criteria and standards used for route selection were appropriate and consistent with national policies.

In the subsequent stages of the Route Selection process, the recommended road network was further refined to ensure the scheme achieves the required objectives in terms of improving traffic flow on the road network and minimises impacts to features of environmental importance. As these factors may at times present conflicting requirements, an integrated approach to the selection process was adopted to ensure that appropriate consideration of all the relevant factors was undertaken. The Route Selection Report presents the outcome of this selection process and provides a coherent summary of the issues which determined the selection of the proposed route. The estimated cost of the scheme at this stage (October 2000) was estimated at approximately £140million (€178million). This estimate included the cost of works that were anticipated due to the development of the network design and the requirements of the Environmental Impact Statement as well as items such as VAT, Preliminaries and Site Investigation.

2.4 Preliminary Design

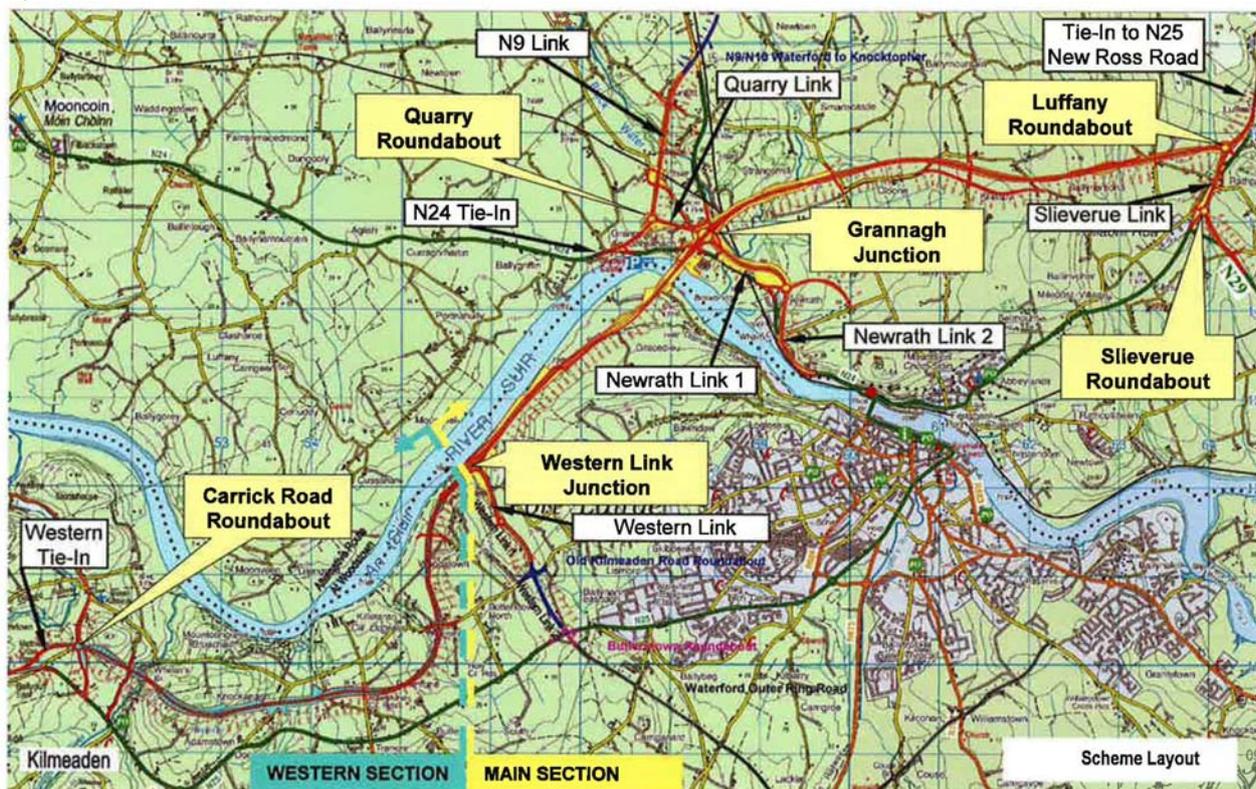
The preliminary design of the selected route was prepared for a standard dual carriageway mainline with a design speed of 100kph, as approved by the NRA. The preliminary design was prepared to a level of detail necessary for the execution of the EIS & CPO statutory procedures. It was also recognised that further design optimisation may be applied during Phase 5, subject to compliance with the statutory approvals. The preliminary design was undertaken in accordance with the NRA Design Manual for Roads & Bridges (NRA DMRB) and best practice design guides, and was progressed in a co-ordinated and iterative manner with the EIS in order to refine impacts, incorporate mitigation measures and ensure adequate land take for the CPO process. The preliminary design process also incorporated topographical surveys, geotechnical investigations, drainage analysis, services design, accommodation works design and a road safety audit. In general, the design information gathered, and resulting design assumptions and philosophies applied during this phase proved robust and valid during subsequent phases of the scheme.

A detailed Bridge Preliminary Report was also produced with regard to the major river crossing of the River Suir at Gracedieu/Grannagh. A Cable Stay Bridge was the recommended form of crossing.

During Phase 5 and following the undertaking of a detailed topographic survey, the design of road alignments was reviewed and included a design speed of 120kph on the dual carriageway element of the Mainline.

The Scheme layout is shown in Figure 4.

Figure 4



2.5 Statutory Process

By virtue of its cross section and length, the scheme came under the category of prescribed road development which required an Environmental Impact Statement. An EIS was therefore prepared as part of the project appraisal procedure for the scheme in accordance with EC Environmental Assessment Directive 85/EEC/337, as transposed into Irish law by The Roads Acts, 1993-2001. The EIS was published and submitted to An Bord Pleanála in February 2001.

A Compulsory Purchase Order for the scheme was published in March 2001. The CPO incorporated all lands necessary for the construction, operation and maintenance of this scheme and included 270 hectares of land acquisition from 215 land owners as well as five residential properties.

A Bridge Order Public Inquiry took place in June 2001 for the proposed crossing of the River Suir. The Bridge order was subsequently signed in January 2003 by the Minister for the Environment and Local Government.

Following receipt of EIS and CPO documents and subsequent related submissions and objections, An Bord Pleanála convened an oral hearing into the scheme. The oral hearing was in session in August 2001, November 2001 and July 2002. The initial session of the oral hearing was in August 2001 and was adjourned until November 2001 to allow for a variation to be made to the Waterford County Development

Plan. Following a request for further information, received in March 2002 from An Bord Pleanála, a further session of the hearing took place in July 2002.

The proposed development was approved by the Board with conditions in October 2002.

Advance archaeological testing in early 2003 revealed “a large substantial and important archaeological site” at Woodstown on the banks of the river Suir. Following consideration of the archaeological information on the Woodstown site, the Minister for the Environment issued directions to Waterford City Council in respect of the site in May 2005. The monument is considered to be “a multi-period site with Viking occupation” and “of national importance because of its archaeological and historical significance and is a National Monument within the meaning of the Act”, The Act being Section 14A(4)(d) of the National Monuments Act 1930 (as amended).

Initially, consideration was given to preserving the site in-situ by using lightweight fills and other geotechnical techniques to permit the road to be built over the topsoil. The possibility of full excavation and resolution of the site was also considered, however, the timeframe for such resolution would have been prohibitive. An alternative route was therefore proposed at the western end of the scheme to preserve the National Monument site. It should be noted that an access road and an underbridge to the Woodstown National Monument site was constructed as part of the N25 Waterford Bypass scheme to allow access to the National Monument site.

A CPO and an EIS were published for the Alternative Route at Woodstown in June 2006. An Bord Pleanála convened an oral hearing into the alternative route in October and November 2006, and approval was granted by An Bord Pleanála to the CPO and EIS for the alternate or re-aligned route of the Bypass in February 2007.

As the proposed scheme lies within County Waterford, County Kilkenny, and Waterford City, an agreement was made under Section 59 of the Local Government Act in March 2000, appointing Waterford City Council as lead authority for the scheme, and delegating duties and functions in respect of the scheme, and as outlined in the Agreement, to Waterford City Council.

2.6 Procurement Process

In June 1999, there had been a Government announcement regarding Public Private Partnership (PPP) quoting the aim of attracting private investment. The Waterford Bypass project was specifically earmarked as a PPP scheme (at that stage it was one of three pilot PPP Projects along with the Limerick Tunnel project and the construction of a second bridge at West-Link on the M50 in Dublin). The scheme would include hard tolling.

Following a prequalification process, four consortia including major national and international contractors along with technical, financial and legal advisors were short listed to tender for the project. They were:

- **Celtic Roads Group** – HBG Ascon Limited, Edmund Nuttal Limited, National Toll Roads plc and Grupo Dragados S.A.
- **Erin Route** – Carillion Private Finance Ltd., Balfour Beatty Capital Projects Ltd, Egis Projects S.A. and WS Atkins Investments Ltd.
- **Hegarty-Vinci** – Vinci S.A. and P.J. Hegarty & Sons.

- **Sli Nua** – Morrison Development Partnerships Ltd, NCC AB, R. O'Rourke & Son Ltd., Barclays Capital, Intertoll Management Services BV and the Halcrow Group in association with John B Barry and Partners.

Tender documents were issued in September 2001 and following a number of tender consultation meetings tenders were returned in April 2002

Tenders for the Project were received in April 2002 and these were evaluated in detail and two of the four consortia were short-listed for BAFO stage. They were:

- **Celtic Roads Group** – HBG Ascon Limited, Edmund Nuttal Limited, National Toll Roads plc and Grupo Dragados S.A.
- **Hegarty-Vinci** – Vinci S.A. and P.J. Hegarty & Sons.

The invitation to submit Best and Final Offers (BAFO) was initially issued in July 2003 and the process commenced. However, having regard to the uncertainties relating to the archaeological discovery at Woodstown referred to in section 2.5, the process was extended to permit the contract to be amended if necessary to reflect the outcome of the discovery. Once it became clear that a new route which avoided the National Monument site was required, the requirements were amended to divide the project in two at the Western Link Junction and allow for a delayed site handover of the Western Section (which included the Woodstown Alternative). This gave time to carry the alternative section through the statutory process. The amended contract also allowed for the omission of the western section in the event that the statutory approval was not obtained in a timely fashion.

The BAFO tenders were submitted on 7th November 2005. Following a technical, legal and commercial evaluation of the tenderers, a contract was awarded to Celtic Roads Group and the contract was signed on 21st April 2006.

2.7 Consultation Process

Statutory and non-statutory public consultations were undertaken during the constraints, route selection, preliminary design and the EIS phases of the project. Where possible, the issues and concerns identified during these consultations were incorporated into the design of the scheme and addressed in this EIS.

A preliminary public consultation was held in City Hall, Waterford in July 1997, at which the route corridor, as recommended by the feasibility study, was displayed for the public's information.

Between 20 July and 26 July 1998, Waterford County Council, Waterford City Council and Kilkenny County Council held a public exhibition in Waterford. The exhibition included information about the development of the scheme, plans of the proposed route options, artistic impressions of the bridge designs and information about environmental constraints. Consultations with concerned groups continued after the public consultation in July 1998.

Further routes were examined as a result of the consultation process and amendments to original proposals were made. The recommended route was then presented to the three Local Authorities on the 26th of July 1999 and put on public display for one month. At the end of the display period, two public information days were held. Further examination of the recommended route was necessary as a result of

submissions received following the information days. This resulted in modifications to the previously recommended route and further consultations. The resulting route was presented on the 10th July 2000.

Consultations with a number of organisations were carried out during the above process. These organisations included; National Parks and Wildlife, Duchas The Heritage Service, National Monuments Service, Southern Regional Fisheries Board, Geological Survey of Ireland, Environmental Protection Agency, Irish Wildlife Trust, Office of Public Works, Department of the Marine and Natural Resources, and Coras Iompair Eireann.

Following the discovery and subsequent designation of the Woodstown Site as a National Monument Site in May 2005 and the decision to develop an alternative route to bypass the site, a Route Selection Report was published in October 2005. Consultations with the public and individual groups were undertaken to ascertain the positive and negative impacts of the proposed recommended route. Objections and submissions were addressed at the An Bord Pleanála Oral Hearing convened in October 2006.

Consultations are generally considered to have been extensive, mutually informative and of good quality.

2.8 Key Project Milestones

The following summarise key project dates in chronological order:

Milestone	Date	PMG Phase
Appointment of Consultant (Mott MacDonald)	March 1996	Phase 3
Waterford Second River Crossing Stage 1 Final Report	May 1997	Phase 3
Preliminary Public Consultation	July 1997	Phase 3
Public Exhibition	July 1998	Phase 3
N25 Waterford Bypass Route Selection Report Published	November 1999	Phase 3
Section 59 Agreement between Waterford City Council, Waterford County Council & Kilkenny County Council	March 2000	-
N25 Waterford Bypass second River Crossing Bridge Preliminary Report.	February 2001	Phase 4
N25 Waterford Bypass –Environmental Impact Statement (EIS)	February 2001	Phase 4
Draft Toll Scheme for the N25 Waterford Bypass Signed	19 th February 2001	-
N25 Waterford Bypass – Compulsory Purchase Order 2001	March 2001	Phase 4
Bridge Order Public Inquiry	12th June 2001 & September 2001	Phase 4
N25 Waterford Bypass Oral Hearing	August 2001& November 2001 & July 2002	Phase 4
PPP Tender Issue	September 2001	Phase 5
Report to the Board of the National Roads Authority on the Oral Hearing to inquire into the matters raised in the objections received to the Draft Toll Scheme	9 th January 2002	-
An Bord Pleanala Additional Info request	February 2002	Phase 4
N25 Waterford Bypass Archaeological Investigation: Contract 1. Commencement of Works.	February 2002	Phase 5
N25 Waterford Bypass Archaeological Investigation: Contract 2. Commencement of Works.	February 2002	Phase 5
PPP Tender Return	March 2002	Phase 5
N25 Waterford Bypass Additional Information requested by An Bord Pleanala Issued (Report & Drawings)	May 2002	Phase 4
An Bord Pleanala Hearing - Additional Info	July 2002	Phase 4
PPP BAFO shortlisting announced	October 2002	Phase 5
An Bord Pleanala CPO Confirmation and Orders Approved	18th October 2002	Phase 4
Bridge Order Signed	13th January 2003	Phase 4
N25 Waterford Bypass - Supplementary Ground Investigations. Completion of Works.	March 2003	Phase 5
NRA Board's determination of the Draft Toll Scheme for the N25 Waterford Bypass	8 th April 2003	-
Public Notice – Adoption of the Toll Scheme for the N25 Waterford Bypass	14 th May 2003	-
PPP BAFO Invitation	July 2003	Phase 5

Milestone	Date	PMG Phase
Foreshore Lease issued	21 st August 2003	Phase 4
Section 85 Agreement between Waterford City Council & Waterford County Council	September 2003	-
N25 Waterford Bypass Advanced Works Contract – Butlerstown Roundabout. Tender Returns.	October 2003	Phase 5
N25 Waterford Bypass Woodstown 6 – Proposal for preservation In Situ of Archaeological Remains	January 2004	Phase 5
N25 Waterford Bypass Archaeological Investigation: Contract 3. Commencement of Works.	January 2004	Phase 5
N25 Waterford Bypass Advanced Works Contract – Butlerstown Roundabout. Commencement of Works.	16 th February 2004	Phase 5
N25 Waterford Bypass Investigation of Alternative Routes at Woodstown.	November 2004	Phase 5
N25 Waterford Bypass Advanced Works Contract – Butlerstown Roundabout. Completion of Works.	20 th February 2005	Phase 5
Draft N25 Waterford Bypass PPP Alternative Route at Woodstown Design Report	June 2005	Phase 3/4
N25 Waterford Bypass – Alternative Routes project at Woodstown –Environmental Assessment of Route Options	June 2005	Phase 3/4
N25 Waterford Bypass – Alternative Route at Woodstown Ground Investigations Contract.	July 2005	Phase 3/4
Section 85 Agreement between Waterford City Council & Waterford County Council	July 2005	-
N25 Waterford Bypass Waterford Crossing Alternative Route Site Investigation at Woodstown Factual Report	September 2005	Phase 3/4
N25 Waterford Bypass – Alternative Route at Woodstown Ground Investigations. Completion of Works.	4 th October 2005	Phase 3/4
N25 Waterford Bypass Alternative Route at Woodstown Geotechnical Interpretative Report.	October 2005	Phase 3/4
N25 Waterford City Bypass – Route Selection Report in the vicinity of the Woodstown Archaeological Site.	October 2005	Phase 3/4
N25 Waterford Bypass Advanced Works Contract – Old Kilmeaden Road Roundabout. Tender Returns	October 2005	Phase 5
Route Selection in the Vicinity of Woodstown Archaeological Site – Additional Information Requested by An Bord Pleanala Drawings	November 2005	Phase 3/4
N25 Waterford Bypass Advanced Works Contract – Stone Faced Wall at Adamstown. Tender Returns	November 2005	Phase 5
PPP BAFO Return	November 2005	Phase 5
N25 Waterford Bypass Advanced Works Contract – Old Kilmeaden Road Roundabout. Commencement of Works.	16 th January 2006	Phase 5
Alternative Route Test Trenching started.	February 2006	Phase 5
Contract signing/Contract Award	21 st April 2006	Phase 5
Design & Construction Commencement	21 st April 2006	Phase 6
N25 Waterford Bypass Advanced Works Contract – Stone Faced Wall at Adamstown. Commencement of Works.	May 2006	Phase 5
N25 Waterford Bypass Alt Route – Compulsory Purchase Order 2006	June 2006	Phase 4
N25 Waterford Bypass – Woodstown Alternative Route EIS	June 2006	Phase 4

Milestone	Date	PMG Phase
N25 Waterford Bypass Advanced Works Contract – Old Kilmeaden Road Roundabout. Completion of Works.	10 th August 2006	Phase 5
N25 Waterford Bypass Advanced Works Contract – Stone Faced Wall at Adamstown. Completion of Works.	9 th October 2006	Phase 5
N25 Waterford Bypass Woodstown Alternative Route – Additional Information Requested by An Bord Pleanala.	October 2006	Phase 4
N25 Waterford Bypass Woodstown Alternative Route Oral Hearing	October & November 2006	Phase 4
An Bord Pleanala Alternative Route Approval	February 2007	Phase 4
N25 Waterford Bypass Advanced Works Contract – Stone Faced Wall at Bawnfunne. Tender Returns	March 2007	Phase 5
N25 Waterford Bypass Advanced Works Contract – Stone Faced Wall at Bawnfunne. Commencement of Works.	13 th September 2007	Phase 5
N25 Waterford Bypass Advanced Works Contract – Stone Faced Wall at Bawnfunne. Completion of Works.	10 th October 2007	Phase 5
N25 Waterford Bypass Advance works contract – Landscaping at Dooneen and Western Link 2. Tender Returns	February 2008	Phase 5
N25 Waterford Bypass Advance works contract – Landscaping at Dooneen and Western Link 2. Commencement of Works.	December 2008	Phase 5
N25 Waterford Bypass Advance works contract – Landscaping at Dooneen and Western Link 2. Substantial Completion of Works.	January 2009	Phase 5
Draft Toll Bye-Laws for the N25 Waterford Bypass published	12 th March 2009	-
Toll Bye-Laws for the N25 Waterford Bypass signed and published	12 th May 2009	-
Public Notice – Toll Scheme for the N25 Waterford Bypass published	25 th June 2009	-
Public Notice – Bye Laws for the N25 Waterford Bypass published	26 th June 2009	-
Official opening of the N25 Waterford Bypass (Issue of Permit to Use/ Taking Over Certificate for 14 roads of the Waterford Bypass including the N25 Mainline)	19 th October 2009	Phase 6
Issue of Taking Over Certificate for a further 12 roads	12 th November 2009	Phase 6
Issue of Taking Over Certificate for a further 6 roads	22 nd December 2009	Phase 6
Completion Date of Bypass	July 2010	Phase 6

3. Project Implementation

3.1 Project Management Structure

The following figures summarise project management structures for the Authority, the PPP Company and the Construction Joint Venture.

Figure 5: Authority Project Management Structure

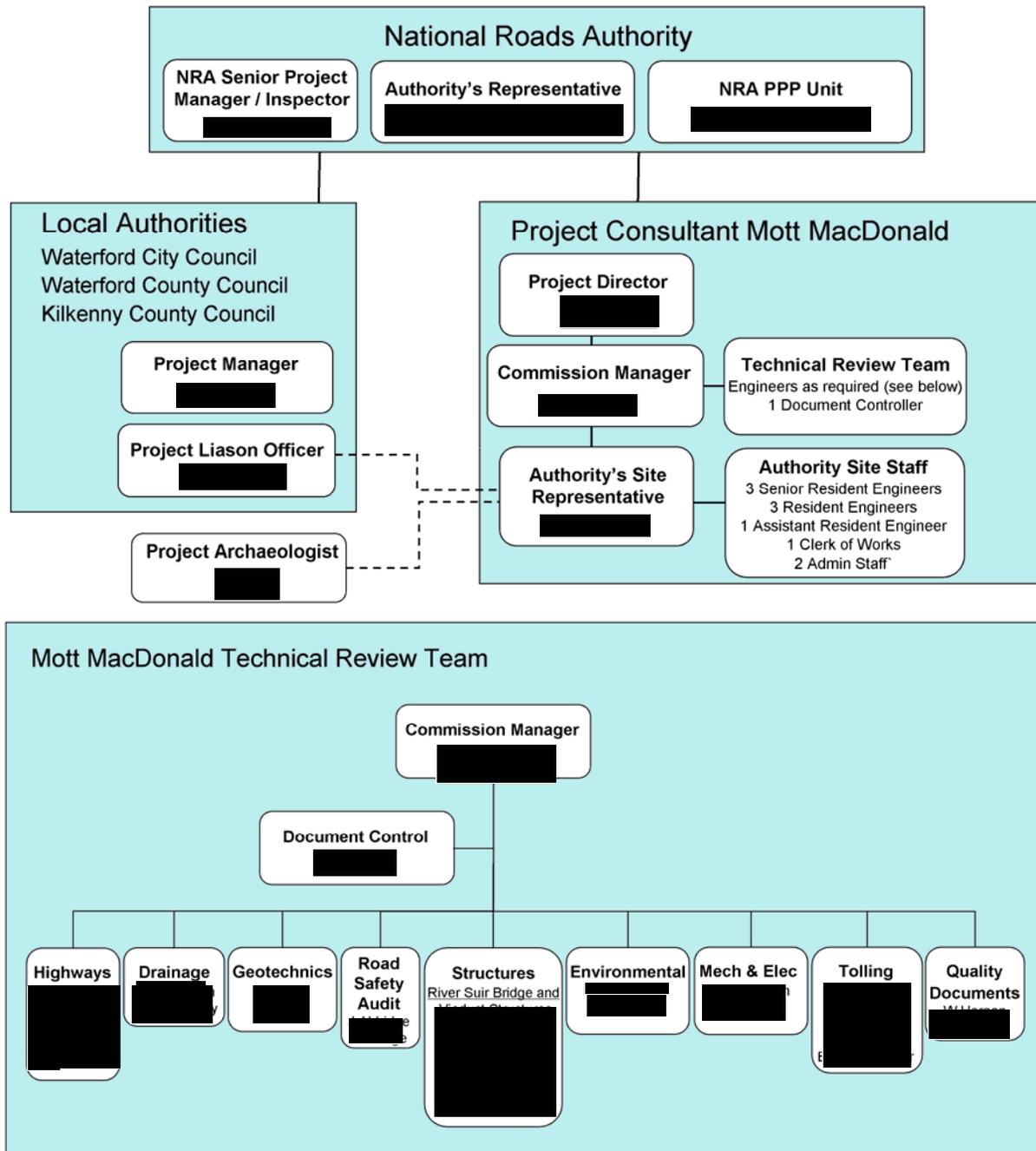


Figure 6: PPP Company Structure

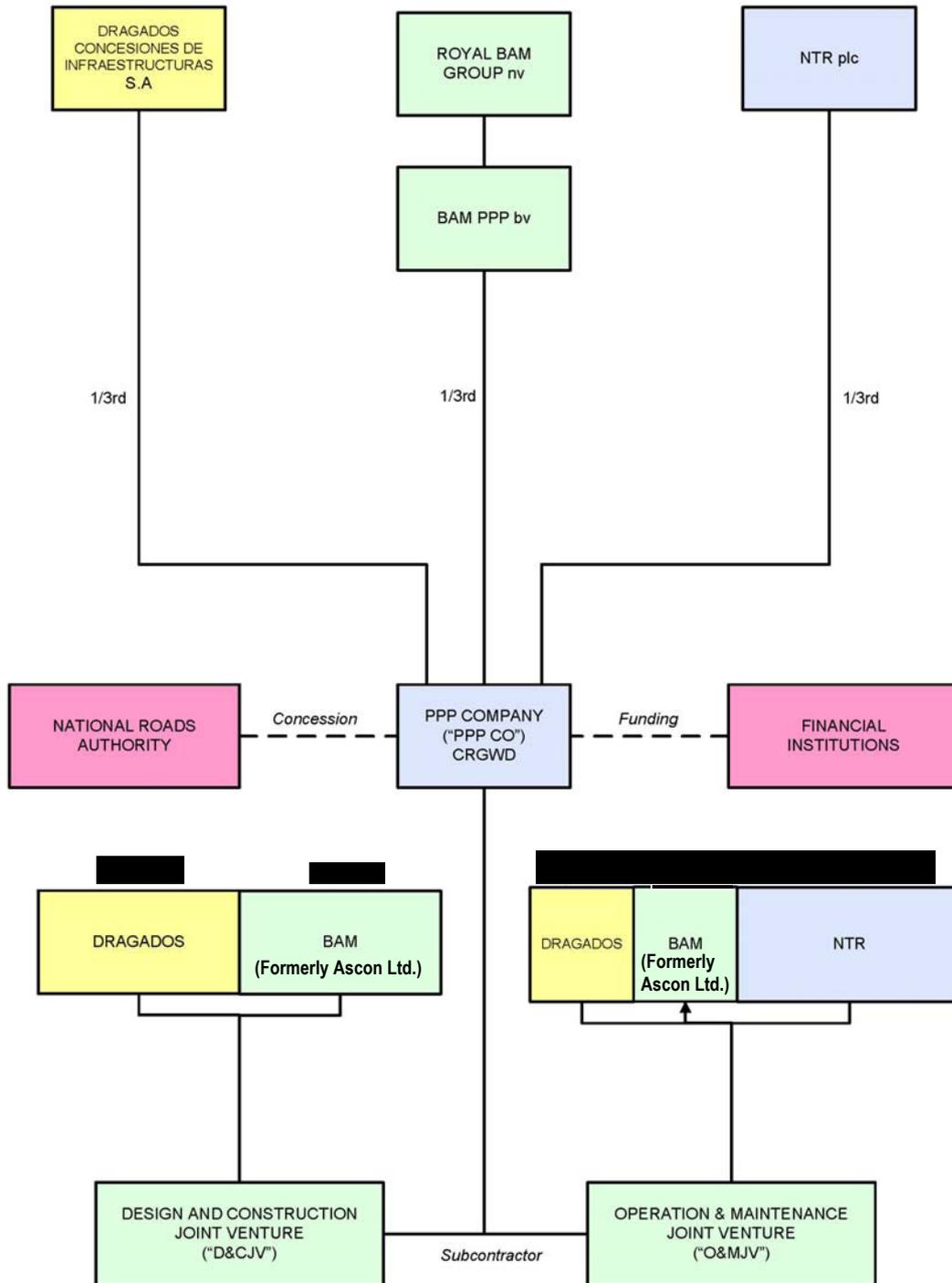
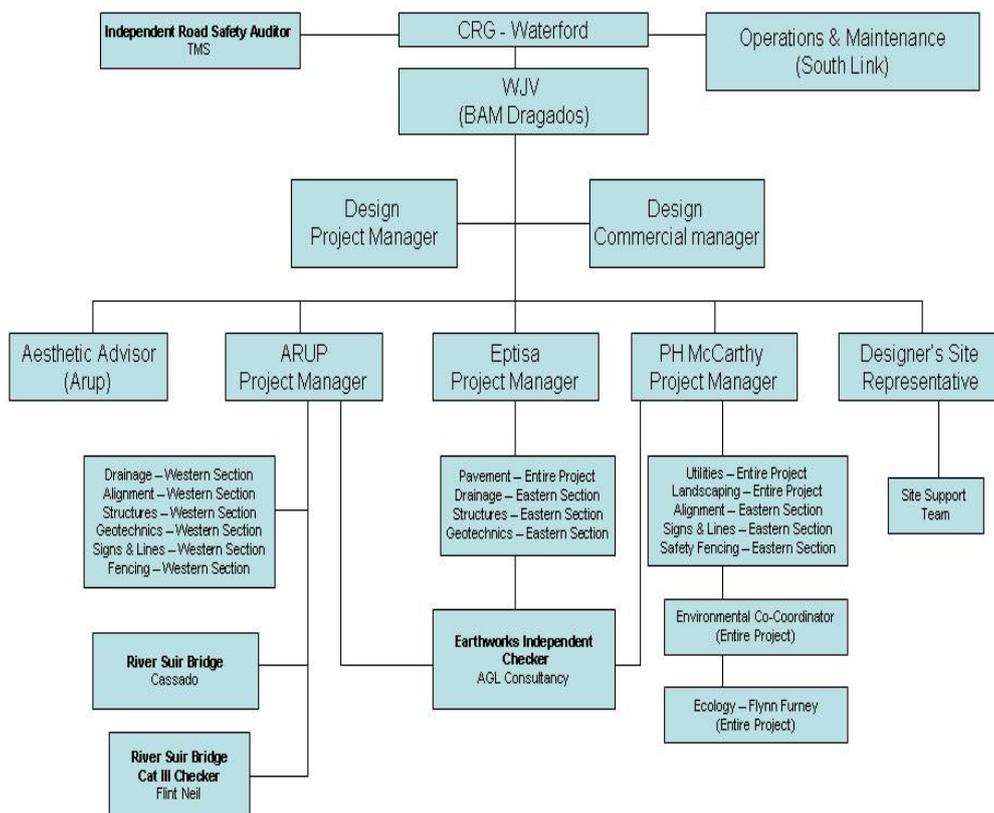


Figure 7: Construction Joint Venture



3.2 Monitoring and Evaluation

Over the course of the construction more than 4500 submissions made by the PPP Company were reviewed by the project consultant Mott MacDonald for compliance with the Construction Requirements as set out in Schedule 4. Standard response sheet templates were prepared by Mott MacDonald (MM) and used to assist in the process of closing out any issues raised in a systematic way. Comments from the Authority’s Site Team, and from Mott MacDonald offices outside Ireland for submissions where specific expertise was required, were incorporated into the standard response sheets.

The PPP Co’s Certification Procedure applying to certificates to be supplied to MM by the PPP Co was set out in Schedule 5 of the Agreement, including the response period required of MM. A 20 working day review period applied to new certificates for Quality and Environmental Documentation, Nominated Elements (Category III Structures, Works in the vicinity of railways, and Toll Collection System), Earthworks, Archaeology, Ecology, Handback Inspection, Alternative Conceptual Design and Operation and Maintenance Manuals. A 10 working day review period applied to all other new certificates. A review period of 2 working days applied to certificates which were previously Acknowledged with Comments.

While many certificates were acknowledged without the need for comment, MM frequently issued several rounds of comments regarding certified design submitted before the relevant certificates could be acknowledged. At peak times in the design certification process Mott MacDonald were regularly responding to over 10 design submissions each day, many of these with a 2 working days review period.

The following is a breakdown of the correspondence issued by the various parties;

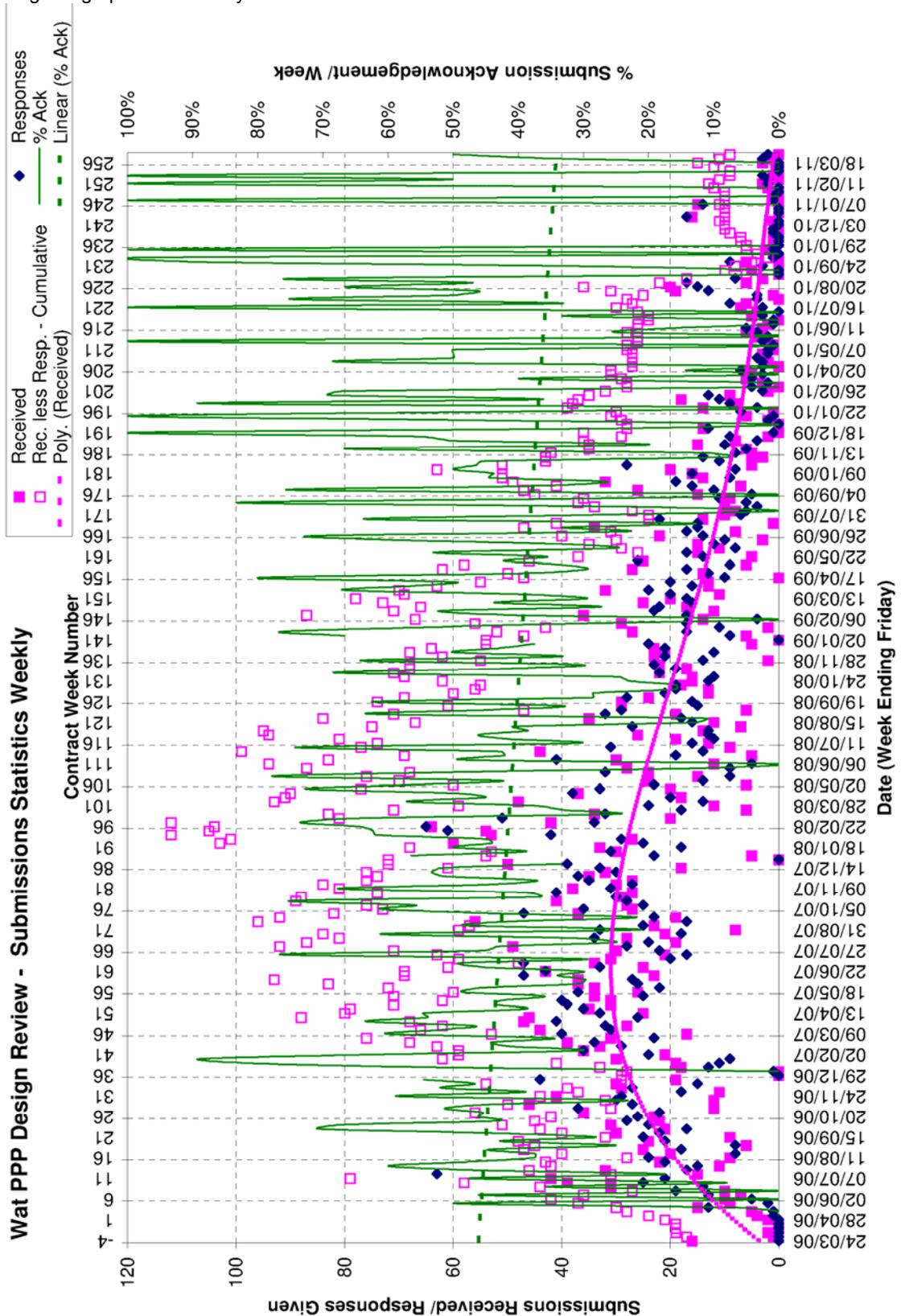
PPP Co correspondence:	4589 items
ASR correspondence:	1714 items
MM correspondence (total):	3593 items
MM correspondence (certification):	2602 items
NRA correspondence:	413 items
ASR Surveillance Reports:	379

The following is a breakdown of the Technical Review statistics:

Item	Assigned Review Level Totals							Response Statistics Percentage of overall total. Superseded,W/D etc not included			
	Over All Total	Design (Certificate)			Method Statements		A %	AWC %	R %	RFI %	
		L1	L2	L3	L1	L2					
Quality and Envirn Documentation Cert (3)	97	11 13%	43 49%	33 38%	0	10	39%	42%	4%	5%	
PPP Site Clearance (6.1b)	35	0 0%	16 70%	7 30%	0	12	40%	34%	6%	11%	
PPP Fencing and Envirn Barriers (6.1b)	28	1 4%	3 12%	22 85%	0	2	14%	36%	7%	29%	
PPP Safety Barriers (6.1c)	20	0 0%	6 40%	9 60%	0	5	50%	25%	10%	5%	
PPP Drainage (6.1d)	467	41 12%	219 64%	84 24%	0	121	43%	34%	6%	10%	
PPP Earthworks (06.1e)	236	5 3%	129 69%	53 28%	6	43	48%	33%	8%	5%	
PPP Road Pavement (6.1f)	53	0 0%	30 73%	11 27%	1	11	45%	36%	11%	6%	
PPP Road Layout (6.1g)	117	13 12%	67 61%	30 27%	0	7	39%	20%	9%	19%	
PPP Kerbs and Footways (6.1h)	19	3 20%	5 33%	7 47%	0	4	11%	58%	11%	16%	
PPP Traffic Signs and Road Mark (6.1i)	20	0 0%	8 40%	12 60%	0	0	5%	35%	0%	50%	
PPP Road Lighting (6.1j)	20	0 0%	11 55%	9 45%	0	0	25%	50%	0%	20%	
PPP Non-Payment Communications (6.1k)	3	0 0%	2 67%	1 33%	0	0	67%	33%	0%	0%	
PPP Payment Communications (6.1l)	2	0 0%	0 0%	0 0%	0	2	50%	0%	50%	0%	
PPP Structures Cat 3 RW (6.1m Cat3)	346	4 2%	110 47%	119 51%	3	110	34%	35%	5%	13%	
PPP Structures (6.1m)	1099	125 14%	489 55%	275 31%	4	201	44%	24%	8%	10%	
PPP L/scape and Envirnl Works (6.1n)	41	0 0%	12 40%	18 60%	0	11	29%	41%	2%	15%	
PPP Accommodation Works (6.1o)	42	0 0%	10 26%	28 74%	0	4	33%	40%	14%	10%	
PPP Utilities (6.1p)	45	3 11%	17 63%	7 26%	8	10	49%	38%	7%	2%	
PPP Toll Collection System (6.1q)	27	0 0%	5 36%	9 64%	0	10	48%	15%	0%	22%	
PPP Toll Collection Infrastructure (6.1r)	59	1 2%	15 31%	33 67%	0	8	37%	44%	3%	10%	
PPP Miscellaneous (6.1s)	12	0 0%	6 50%	6 50%	0	0	50%	25%	8%	8%	
PPP Departures from Standard (8)	225	0 0%	19 8%	206 92%	0	0	28%	0%	8%	14%	
PPP Archaeology (9)	85	29 40%	37 51%	6 8%	0	13	89%	6%	1%	4%	
PPPAlternative Conceptual Design (10)	92	0 0%	13 14%	79 86%	0	0	41%	20%	8%	25%	
PPPAlternative Conceptual Design AQC (10a)	34	4 12%	5 15%	25 74%	0	0	53%	18%	9%	18%	
PPP Ecology Survey (11)	28	4 14%	21 75%	3 11%	0	0	29%	32%	14%	0%	
PPP Third Party Consultation (12)	268	110 41%	143 54%	14 5%	1	0	66%	19%	1%	10%	
PPP Road Safety Audit (13)	216	0 0%	7 3%	208 97%	0	1	43%	27%	4%	19%	
PPP Temporary Works Cert (14)	258	17 13%	99 77%	12 9%	4	126	38%	32%	8%	12%	
PPP Traffic Management Cert (15)	109	1 1%	93 89%	11 10%	0	4	37%	28%	11%	16%	
PPP Test Confirmation Cert (16)	218	68 31%	147 68%	2 1%	0	1	85%	0%	0%	13%	
PPP Variation Order (52)	181	4 2%	21 12%	156 86%	0	0	20%	1%	6%	10%	
Total	4516	444 12%	1809 48%	1508 40%	27	716	44%	24%	6%	12%	

NOTE: The total only reflects elements that are listed on this page.

The following is a graphical summary of the Technical Review statistics:



A formal monitoring and reporting structure was set up on site at the commencement of the implementation phase. Regular quality meetings were held between the Employers Senior Resident Engineers, the Contractors Quality Manager and the Designers Representative to discuss prevailing quality issues in detail. Key tools in the monitoring of the Works were Non Conformance Reports (NCR). 859 NCR's were filed, and these formed a documented record of deficient, substandard or omitted Works. All of the NCR's were closed by replacement or remedy of defective Works and materials, or by procedural corrections. The method of communication between the PPP Co. and the project consultant Mott MacDonald was chosen to suit the seriousness of the issue under discussion. Major site issues were addressed by letter, while lesser issues were the subject of surveillance reports or discussions on site.

Monthly progress meetings were held between the NRA, the NRA's representatives and PPP Co. The PPP Co. presented monthly reports to the meeting outlining progress, programme updates, health and safety incidents, quality records etc. Any substantial or unresolved issues from the quality meetings were also addressed through this forum. The agenda for the progress meetings generally covered the following topics:

1. Construction
2. Certification Procedure
3. Project Agreement Issues
4. Public Relations
5. Health & Safety
6. Quality management
7. Other Business

Quarterly steering committee meetings were also held. These meetings were attended by senior local authority representatives from the three authorities involved with the project and the NRA, as well as the project consultant Mott MacDonald. Mott MacDonald presented a report to this meeting which included a summary of the Contractors progress report, commentary on progress, quality etc, and a financial report including valuation updates, financial projections, land acquisition updates and NRA Project Reporting System (PRS) updates. Any substantial or unresolved issues from the progress and/or quality meetings were also addressed through this forum.

On the issuing of the Permit to Use for the Project Road and other ancillary roads, a comprehensive outstanding works list was prepared by the ASR site staff and issued to the PPP Co for completion. The outstanding works lists contained 3045 items in total. These items were either completed by Contract Completion date, or a later date was agreed for specific items. A Defects Listing was also issued to the PPP Co. post Permit to Use setting out the defective work items noted by the ASR site staff.

3.3 Project Scope

The project scope as set out in the Construction Requirements was for the design and construction of the N25 Mainline together with Other Works roads and Ancillary Works roads. The scope also includes the operation and maintenance of the Project Road for the 30 year concession period beginning in April 2006 and expiring in April 2036.

The Project Road comprises the following sections of road, encompassing all elements between the boundary fences or walls and including the boundary fences or walls:

- The N25 Western tie-in (N25 National Road) from the existing N25 west of Matthews Cross Road to the Carrick Road Roundabout.

- The N25 Mainline (N25 National Road) from the R680 Carrick Road Roundabout to the Luffany Roundabout, including the roundabouts and circulatory carriageways.
- All elements of the Grannagh Junction, formed at the intersection of the N25 mainline, the Quarry link (N9) and Newrath Link Section 1 (R448) including all circulatory carriageways, ramps and tapers.
- All elements of the Western Link Junction, including roundabouts, circulatory carriageway, ramps and tapers.
- The Slieverue Link (N29) from the Luffany Roundabout to the Slieverue Roundabout, including the roundabouts and their circulatory carriageways.
- The Quarry Link from the Grannagh Junction through to the Quarry Roundabout, including the roundabouts and their circulatory carriageways.
- The N25 New Ross Road Tie-in from the Luffany Roundabout to the existing N25.

Other Works Roads consist of the following roads:

- R680 Carrick Road Tie-In.
- Kilmeaden Village Link Road.
- Kilmeaden Village Tie-In.
- Matthews Cross Realignment.
- Lacka Road.
- Local Road at Bawnfune.
- Old Kilmeaden Road.
- Woodstown Site Access Road.
- W.I.T Waterfront Access Road.
- Western Link 1.
- W.I.T Entrance.
- N24 Tie-In.
- Castle Access 1.
- Castle Access 2.
- N9 Link.
- Dunkitt Road.
- Newrath Link Section 1.
- Newrath Link Section 2.
- Newrath East Link Road.
- Kilmacow Road N9 Realignment.
- Kilmacow Road Junction Realignment.
- Ferry Underpass.
- Granny Bridge Access Road.
- Newrath Tie-In.
- Existing N9 Realignment.
- Mullinabro Road Tie-In.
- Cloone Road Section 1.
- Cloone Road Section 2.
- Ballyrobin Road.
- Nicholasstown Road.
- Airmount Bridge.
- N29 Port Road Tie-In.
- Ferry Bank Tie-In.
- Slieverue Roundabout Tie-In.
- Luffany Tie-In.

Ancillary Works Roads consist of the following roads:

- Kilmeaden Connection 1.
- Kilmeaden Connection 2.
- Kilmacow Road Connection.
- Castle Connection.
- Granny Connection.
- Newrath Connection.
- Cloone Connection.
- Airmount Connection.
- Luffany Connection.

3.4 Value and Risk Management

Whereas the formal value and risk management procedures as set down in the current NRA Project Management Guidelines and NRA Cost Management Manual, were not in place during the Project Planning phase of the project, particular risks were identified and managed from the Preliminary Design stage through to the Statutory Process phases. Furthermore, risk management workshops were conducted during tender document preparation stage which informed the calculation of scheme cost for Phase 5. The tendering process permitted Tenderers to carry out a significant level of value engineering which is reflected in submitted tenders and the final offer accepted by the Authority.

Site specific risks identified and managed included the following:

1. Archaeology – Significant archaeological investigation took place prior to contract award limiting PPPCo archaeological works requirements to a number of localised un-tested areas.
2. Site Availability – Following the archaeological discovery at Woodstown and the subsequent designation of the area as a National Monument, the contract facilitated the sectioning of the works allowing a period of time after the Commencement Date in which to establish and secure Orders for an Alternative Route at Woodstown.
3. Unforeseen Ground Conditions – Extensive ground investigation works were carried out pre-tender to limit the risk. Further site investigations were also facilitated during the tender period which enabled Tenderers to request their particular requirements.
4. Drainage – potential to exacerbate flooding in certain areas, including areas at Dooneen, were dealt with by the inclusion of specific mitigating requirements.
5. Irish Rail Interfaces – Particular requirements and Bridge Agreements in place prior to construction. However, potential existed for delays during the IR design approval period.
6. Surplus Earthworks Material – The preliminary design and EIS identified a significant volume of surplus material which required to be managed by the PPPCo during the Design and Construction.
7. Interfacing with other Schemes – The Work included a tie-in with the N9 Waterford to Knocktopher Scheme.

It is noted that in general, all risks are transferred to the PPPCo under the PPP Contract with the exception of planning risk as the scheme received An Bord Pleanála approval prior to contract award, and to an extent, some legal risk.

3.5 Project Schedule Compliance

The Commencement Date for the N25 Waterford Bypass PPP Contract was April 2006, after which time the detail design and construction commenced. The scheme achieved Permit to Use (opened to traffic) in October 2009, followed by the issue of the Completion Certificate in July 2010. The issuing of the Completion Certificate was in accordance with the date set down in the PPP Contract.

The Operation and Maintenance element of Project Road will continue to be managed by the PPP Company until the Expiry Date of April 2036.

3.6 Project Budget Compliance

For the purposes of comparison, the estimated project costs at PMG Phase 5 (Tender) and the Phase 7 (Following Construction) have been considered. These costs include Land Costs, Construction Costs and other costs which include planning and design, advance investigation and facilitation contracts, archaeology, residual networks and contract supervision. Costs included are those applicable at the time with no adjustment made for subsequent inflation and are inclusive of VAT.

Description	Phase 5 (Post Tender)	Phase 7 (Following Construction)
Total	€255,400,000	€202,600,000

After tendering, the Phase 5 estimated cost for the scheme was €255.4 million. The Phase 7 costs (following construction) was €202.6 million which is 20.7% below the scheme estimate at contract award including the provision for construction inflation. A significant element of this lower out-turn cost may be attributable to the efficiencies of land acquisition, planning and design costs together with the non realisation of risk items allowed for at Phase 5.

The Construction Variation process (Schedule 12) was used to amend the scope of the works where necessary. A total of 3 Authority's Construction Variations and 56 PPP Company Construction Variations were raised in the course of the Design and Construction period. The Authority's Construction Variations related to changes in scope, while PPP Company Construction Variations related to changes to the Construction Requirements for the scheme.

The three Authority Construction Variations issued over the course of the construction of the scheme comprised the following:

- ACV 01 - N9 Tie-in
- ACV 02 - Alternative Route Accommodation Works
- ACV 03 - Project Signage (Design and Construction)

Negotiation between the Authority and the PPP Co resulted in the agreement of ACV 01 and ACV 02 on a cost neutral basis.

ACV 03 is in relation to Project Signage and was required due to the updating of the Traffic Signs Manual. Consequently Project Signage was required to be redesigned which resulted in increased overall number and size of signs compared to the original specimen design requirements included in the Agreement. The original financial agreement was subsequently modified following confirmation of ACV 03, with an additional cost to the Authority of €1,725,000 plus VAT at 13.5% for the construction phase.

[REDACTED]

[REDACTED]

Therefore all Authority and PPP Co Variations issued during the Design and Construct Period were agreed to be cost neutral, with the exception of Authority Construction Variation ACV 03 as outlined above.

4. Project Operation Performance

4.1 Achievement of Objectives

With reference to the key objectives outlined in section 1.4, it is considered that the project is achieving all of the objectives stated.

4.2 Predicted versus Actual Traffic Volumes

Predicted traffic volumes for the N25 Waterford Bypass are given in the “Explanatory Statement accompanying the Draft Toll Scheme for the N25 Waterford Bypass” which is a publicly available document. This predicted 13,900 vehicles per day passing through the toll collection location in 2005 (the anticipated opening year of the scheme) and 40,700 vehicles per day in 2025. These figures were obtained from High Growth scenarios predicted in the Waterford Toll Study which was first issued in August 2000. This toll study also included Low Growth scenarios which predicted 8197 vehicles per day passing through the toll collection location in 2005 with 17,382 vehicles per day in 2025. It is worth noting that the Waterford Toll Study and the Environmental Impact for the Scheme evaluated the environmental impacts of the Toll Plaza. In this regard it was considered prudent to assess the more conservative High Growth scenario for the assessment of impacts of the Toll Plaza including toll plaza size, landscape, noise and air quality.

For the purposes of comparison, the following table summarises calculated AADTs which have been obtained from the following sources:

- NRA Traffic Counter N25-2a (Waterford Bypass West)
- NRA Traffic Counter N25-1a (Waterford Bypass East)
- Monthly ADT figures advised by CRG at Monthly Monitoring Meeting as reported in the monthly Operation and Tolling Reports.

Current Traffic (AADT)

Year	Wat Bypass West N25-2a (Kilmeaden)	Toll Plaza	Wat Bypass East N25-1a (Kilaspy)
2010	7828	5260	4921
2011	7925	5677	4963

4.3 Implications for Ex Ante Appraisal

This project was completed with an out turn cost which was 20.7% less than the Phase 5 estimated cost as outlined in section 3.6 and in addition the project objectives as set out in section 1.4 have been generally met. However as outlined in section 4.2 the actual traffic volume currently using the toll collection facility is less than the traffic predictions stated in the Toll Scheme documentation.

However, in consideration of the long duration of the contract, with over 25 years remaining in the operation phase, it is perhaps not appropriate at this time (2012) to draw conclusions in respect of the current performance of the traffic compared to the traffic volume predictions given in the Toll Scheme documentation.

4.4 Traffic Operation and Road Safety Outcomes

The scheme is delivering significant improvements in terms of capacity, traffic flow, travel times, driver comfort and road safety. No significant problems have emerged in terms of traffic operation or road safety.

A Stage 4 Road Safety Audit which addresses issues relating to traffic operation and road safety was undertaken in late 2010. This identified a number of minor issues together with suggested remedial measures to be undertaken, including:

- Improved lane designation and line markings at Project Road Roundabouts and the addition of arrow markings on approaches to roundabouts and lane markings on the exit from the roundabout circulatory carriageways.
- Addition of advance bend warning signs and chevron signs at the Western Tie in.
- Advance height restriction warning signs to be installed at the N24 turnoff and on the approach to the Ferry Underbridge indicating height restrictions.

These remedial measures were undertaken in 2012.

5. Overview of Issues Arising

5.1 Iarnród Éireann Consultation and Consent

Mott MacDonald consulted with Iarnród Éireann (IE) for all railway interfaces on the scheme. On foot of these consultations, specific requirements were incorporated into the Construction Requirements to meet both site specific and general IE requirements.

Detailed consultation between the PPP Company and IE took place over an extended period, and IE approval was attained for relevant works prior to commencement. The length of the consultation period on this scheme, along with that for several other contemporary schemes, led to the agreement of a streamlined technical approvals process for railway structures between the NRA and IE for future schemes.

5.2 Information Contained in Environmental Impact Statement

An Environmental Impact Assessment was carried out by RPS Consultants in conjunction with Ewbank Preece O hEocha (now Mott MacDonald Ireland) and Tramore House Regional Design Office. The scope of the environmental assessment was based upon the statutory environmental requirements defined in the EIA Regulations. In addition, an Environmental Impact Study of the Suir River Crossing is included in the overall EIS for the scheme. Topics addressed in the N25 Waterford Bypass Environmental Impact Statement include;

- Human Environment
- Agriculture
- Ecology
- Geological Heritage
- Hydrogeology
- Water Quality and Fisheries
- Air Quality
- Noise
- Landscape
- Material Assets
- Cultural Heritage
- Climate

A further Environmental Impact Statement (EIS) was prepared for the proposed alternative route at Woodstown. The Environmental Impact Statement included a detailed assessment of the route under the following headings:

- Human Environment
- Air Quality
- Noise
- Landscape & Visual
- Flora & Fauna
- Water Quality & Fisheries
- Soils, Geology & Hydrogeology
- Surface Water/Hydrology
- Material Assets
- Agriculture
- Cultural Heritage

The impact on Cultural Heritage and Archaeology was given particular emphasis and was informed by a significant level of investigations and physical testing. This was considerably in excess of the level of information normally available for such evaluation.

5.3 Application of Noise Mitigation Requirements

The N25 Waterford Bypass Environmental Impact Statement (February 2001) published details on the Noise Mitigation requirements for the scheme. Properties and noise sensitive areas within 300m of the route were identified and categorised into bands of 100m widths. This follows the methodology of the Design Manual for Roads and Bridges (2000). There were 58 typical assessment locations identified, each representing a number of properties. Many of the locations were rural sites, not affected by existing traffic noise or other identifiable noise sources.

DMRB regulations at the time considered the level of excessive noise impact on a property or noise sensitive area to be 68 dB $L_{A10,18h}$, based on the "Calculation of Road Traffic Noise" (CRTN) method. There were 13 properties identified in the N25 Waterford Bypass EIS (February 2001) which were predicted to exceed this limit. Mitigation measures were identified to be implemented to these properties.

- 1 No. property north of the N25 Mainline, in the townland of Killoteran.
- 1 No. property (Granny Castle) south of the N24 Tie-In, in the townland of Granny.
- 5 No. properties north of the N24 Tie-In, in the townland of Granny.
- 2 No. properties adjacent to the Ferry Underpass, in the townland of Granny.
- 3 No. properties adjacent to Newrath Section 2, in the townland of Newrath.
- 1 No. property south of the N25 Mainline adjacent to the Airmount Bridge, in the townland of Kilmurry.

As stated above, the 2001 EIS dealt with noise impacts at sensitive receptors at representative locations along the route. However for the N25 Waterford Bypass Woodstown Alternative Route EIS (June 2006) as part of works associated with the Alternative Route, revised standards for noise assessments were now in place; as per EU Environmental Noise Directive 2002/49/EC, and the NRA's published guidelines on Noise Assessments in 2004. New L_{den} parameters, were now the new format for quantifying noise. The noise design criterion for national routes was now set as 60 dB(A) L_{den} . The predicted impact of the alternative route identified 4 property locations as listed below where noise levels would exceed the 60 dB(A) L_{den} threshold, and mitigation parameters would have to be implemented.

- 1 No. property south of the N25 Mainline adjacent to the Dooneen Road, in the townland of Dooneen.
- 2 No. properties west of the N25 Mainline, south of the Old Kilmeaden Road, in the townland of Butlerstown North.
- 1 No. property east of the N25 Mainline, north of the Old Kilmeaden Road, in the townland of Woodstown.

Ultimately it is the responsibility of the PPP Co. to adhere to the requirements as set out in the EIS for the scheme and to carry out noise assessments on their chosen design. The use of noise reducing surfacing by the PPP Co. was incorporated into their noise studies for the scheme, and provided the main justification used by the PPP Co. to reduce the amount of other mitigation measures required.

In addition to the noise reducing surfacing, mitigation measures were also implemented at three locations, Cut 3 (Mainline Chainage 2800 to 3350), residence of [REDACTED] on the Old Kilmeaden Road [REDACTED] and the residence of [REDACTED] on the Newrath road [REDACTED]. At Cut 3 this

amounted to an earth bund on the south side of Project Road protecting a number of properties on the Dooneen Road. The bund varies from 1 to 5 metres in height, extending to 6 metres above road level, and is 550 metres long providing both visual and noise screening. At Plot [REDACTED] the boundary wall separating the property from the Project Road was constructed as accommodation works but at a higher standard, 2 metres height and extra thickness construction to provide increased noise mitigation. At Plot [REDACTED] the house is very close to Newrath Link 2 and at a slightly higher elevation. The boundary wall was constructed as a stone faced wall to a height of 2.3m giving improved noise mitigation over a normal boundary wall as well as a visual barrier between house and traffic.

5.4 Phasing of Advance Works

A significant amount of advance work contracts were undertaken prior to commencement of construction works by the PPP Co. These advance works included;

1. Site Investigation & Hydraulic Study Contracts.
2. Construction of Butlerstown Roundabout.
3. Construction of Old Kilmeaden Road Roundabout and Western Link 2.
4. Advance Site Clearance and Temporary Fencing.
5. Advance Archaeological Works.
6. Diversion of Utility Services by Bord Gais and ESB.
7. Accommodation Works Contracts.

Site Investigation & Hydraulic Study Contracts

River Suir Crossing Site Investigation

As part of the route selection process a preliminary site investigations were carried out to assess the geology in the environs of the crossing corridors. Fugro Ltd. were appointed to conduct the site investigation which commenced in April 1998 and was completed in July 1998. An extensive programme of geotechnical fieldwork was carried out.

One of the key findings of the geotechnical investigation was that there were extensive areas of very soft ground at the northern side of Route 1 which would almost certainly require viaducting and would lead to significant cost penalties.

N25 Waterford Bypass Site Investigation

Irish Drilling Ltd were appointed to conduct a site investigation for the emerging preferred route to assess ground conditions and provide data to assist in the design of foundations. Fieldwork commenced in June 2000, the Factual Report was submitted in January 2001, with an addendum submitted in June 2001. Additional testing of soft ground areas was carried out in September 2001, and a report submitted as a further addendum to the Factual Report in October 2001.

N25 Waterford Bypass Woodstown Alternative Route Site Investigation

Irish Drilling Ltd were appointed to conduct a site investigation for the alternative route at Woodstown to assess ground conditions and provide data to assist in the design of foundations. Fieldwork commenced in June 2005, and the Factual Report was submitted in September 2005.

River Suir Crossing Hydraulic Study

As part of the route selection process Irish Hydrodata Ltd. were commissioned in April 1998 to conduct bathymetric and current flow studies within the corridor of the proposed river crossing. The objectives of the study were to determine the river bathymetry and the flow patterns within the corridor under typical tidal conditions and to estimate the tidal levels at the site for mean spring tides.

The bathymetric survey has shown the river to be a smooth erosional river channel varying in depth from 18 m at the upstream end to 9 m at the downstream end. The deepest waters occur on the Kilkenny side of the river. The contours were clearly defined with no major obstructions or unusual features. Currents were found to be strong and well defined and will reach peak surface mean spring speeds of 1.5 and 1.1 m/s on the flood and ebb tides respectively near the Kilkenny shoreline. Extreme tidal currents during highest astronomical tide conditions are likely to exceed 2.0 m/s and these may be elevated further by river flows. Such currents would be expected several times each year. The hydraulic study did not favour any particular route, however the results did indicate that it would be preferable to minimise the number of piers to be constructed in the river channel.

Construction of Butlerstown Roundabout

The Butlerstown Roundabout was constructed as part of an advance works contract by Tony Kirwan Civil Engineering Ltd. in 2004. The Waterford Outer Ring Road was under construction at this time, and the Butlerstown Roundabout was necessary for the Outer Ring Road to connect to existing N25 Cork Road.

Construction of Old Kilmeaden Road Roundabout and Western Link 2

The Western Link 2 (1km of urban dual carriageway) between the Butlerstown Roundabout up to and including the proposed Old Kilmeaden Road Roundabout was also constructed as part of an advanced works contract, and constructed by Wills Brothers in 2005. This section was progressed in order to facilitate proper access to the industrial zoned lands in the North West Suburbs.

Advance Site Clearance and Temporary Fencing

A total of 299 hectares of lands were acquired through CPO process for the project affecting some 220 landowners. Site clearance and preliminary fencing was carried out as part of an advance contract awarded to Wills Brothers during 2005.

Advance Archaeological Works

In order to minimise risk and quantify remaining risk, a significant amount of advance archaeological testing was undertaken. This was divided into two Contracts, Contract 1 for the area south of the River Suir, and Contract 2 for the area north of the River Suir. The works included centreline trenching along the entire length with offset trenches at 45 degrees every 25m. A number of archaeological sites were identified along the route during the testing phase for which archaeological resolution was subsequently undertaken. Early in 2003 the test trenching at Woodstown on the banks of the river Suir revealed that "a large substantial and important archaeological site had been exposed". The site appeared to be multi-period. The limited archaeological excavation indicates Early Christian and Later Viking Age occupation of the site.

Works under a third advance archaeological testing contract commenced in 2003 for any untested areas remaining from the first two contracts.

Diversion of some large scale Utility Services – including Bord Gais Diversions and ESB Diversions

Advance work contracts for the diversion of certain ESB 110kV overhead lines were undertaken from 2005 to 2007. These diversions included lines in the townlands of Kilmeaden, Knockanagh, Dooneen and Bawnfune. These works were undertaken directly by the ESB.

Similarly a diversion of a BGE transmission line was diverted in the townlands of Kilmeaden, Knockanagh, Dooneen and Bawnfune. These works were constructed in 2006. These works were undertaken directly by BGE.

Accommodation Works Contracts

Advance contracts for the construction of accommodation work stone faced walls for certain landowners in the townlands of Knockanagh and Bawnfune were completed by Niall Barry Civil Engineering Ltd. and Peter O'Loughlin Ltd. during the summer of 2006.

5.5 Earthworks

There were specific earthworks issues on this project which posed particular risks to PPP Company and their successful completion of the contract construction works. The most extensive problem was the areas of very soft ground over which embankments were proposed including Dooneen Marsh, the Western Tie-in, the Western Link Junction, and Newrath Link Area. In order to speed up the time for construction of a number of these embankments a system of band drains were constructed, with waters ultimately being drained vertically, resulting in the stabilization of the under lying soils to receive large embankments. The time required for the completion of settlement prior to the construction of these embankments was subsequently reduced. Additionally in the Newrath area some surcharging of the embankment was successfully carried out.

5.6 Drainage

As this PPP Contract was in the form “design, build and operate”, it was decided by the PPP Company that much of the on line road drainage should be as maintenance free as possible. This resulted in large lengths of open surface water channels being constructed throughout the scheme, principally because the maintenance can be carried out by unskilled operatives, work on the channels is quick and requires no specialist equipment, and minor defects can be remedied before developing into a major problem. Additionally inspection is quick and simple and the initial construction cost is compatible with if not cheaper than for piped systems.

Following the decision to use open channels a further innovation was developed in the form of open precast segmental concrete cascades where outfalls were required to be channelled down embankment slopes. These have the same benefits as open at-grade channels and provide additional cost benefits in the speed and ease of construction when compared to traditional methods.

5.7 Service Diversions & Design

As with any large scale roads projects the diversion of the following types of utilities formed part of the main contract:

- Water mains (150 to 600mm dia) as well as numerous property owners service connections.
- Surface Water Sewers (150 to 600mm dia)

- Overhead and underground electricity cables (38 KVa)
- Telecommunications (NTL & Eircom)

In addition, numerous service connections across carriageways were provided, in particular for Farmers, in order to maintain linkages between severed plots of land.

The majority of the larger electricity diversions had been undertaken in advance of the main contract and therefore had little or no impact on the overall programme.

Ducting for future Authority usage/leasing was provided, comprising of 6 x 100mm dia ducts laid along the carriageway verges with 2 on one side and 4 on the other, as well as duct chambers/draw pits at 110m intervals.

5.8 Accommodation Works

Approximately 270 Hectares of lands were purchased from 220 landowners to facilitate the construction of the bypass in three different local authority areas. As Waterford City Council (WCC) was designated as the 'Lead Authority' in accordance with Section 59 of the Local Government Act, all land negotiations and purchases were handled by them.

The Accommodation works varied in extent and complexity but in general the types could be summarised as follows:

- Timber Post and Rail fencing either with or without wire mesh on one side
- Rendered blockwork walls
- Blockwork walls with stone facing on one or both sides
- Alterations to existing, or completely new, entrance piers and gates
- Surface dressed access roads.
- Environmental and noise barriers
- Cast insitu concrete walls

Practically all landowner compensation packages for land value and 'injurious affection' were in place prior to commencement of construction. Where, as a consequence of the Works, realignments of existing roads resulted in modifications to entrances to plots of land, or boundaries and services, the PPP Co had to make provision for alternative accommodation works.

5.9 Effectiveness of Environmental Mitigation Measures

Various measures were implemented throughout the project to mitigate or compensate for some of the predicted environmental impacts of the route. As per the requirements initially detailed in the EIS for the scheme, mitigation was required for;

- Hydrological Impacts – maintenance of existing drainage patterns
- Habitat Fragmentation/Barrier Effects – underpasses/tunnels were installed for mitigation of wildlife road casualties. Badger mitigation was generally completed as per the requirements of the EIS for the scheme. Otter mitigation has generally been provided as per the requirements of the EIS for

the scheme, however while the EIS identified that otter mitigation would be required at both the Killoteran Creek and the Knockhouse Upper Stream, which are approximately 250m apart, mitigation in the form of an underpass was only provided at the Knockhouse Stream, as the PPP Company's Designers concluded that as the 2 streams were relatively close only one underpass for otters would be required.

- Landscape Planting – native species were used in areas designated for planting to reflect the previous vegetation of the area.
- Impacts to Bats – bat mitigation measures were implemented as per the EIS requirements. Bat boxes were constructed at various locations throughout the site.

Meadow Barley Translocation

Mitigation was required to translocate a rare species of the meadow barley from the Railway meadow and Grannybridge Meadow (through which the bypass works would now cross). A designated site adjacent to the existing meadow was identified as an area for the translocation of this meadow barley. These works were undertaken as a separate contract to the PPP Contract, and Niall Barry Civil Engineering Ltd. undertook these successful translocation works during 2006.

5.10 Bridge Aesthetics

The requirement for this PPP contract was that all Structures be of a high aesthetic quality. It was the responsibility of the PPP to ensure that appropriate aesthetic considerations be given to structures at all stages of their design and construction.

In terms of the general under and over bridges for the scheme, consistency of finish was achieved giving the appearance of a “family” of Structures throughout the length of the Works. The aesthetics of individual structures proposed by the PPP Co formed an integral part of the review, certification and approval process, amongst the various parties of these formal processes.

Certain predefined aesthetical requirements were detailed in the Construction Requirements issued by the Authority to the PPP Co, including;

- Concrete crossheads for supporting bridge decks over intermediate supports were permitted where the deck was formed from precast or steel beams, or reinforced concrete deck slabs made fully monolithic with the substructure provided the beam stitch detail was hidden from view in the elevation by means of an aesthetic screening element extending up from the pier/ crosshead beam,
- Single span bridges or four span bridges over dual carriageways were generally not permitted,
- Insitu reinforced concrete bankseats, wingwalls, abutment walls, and wall type piers have a pattern profile type finish which is consistent throughout the Works,
- Overbridges were provided with open side spans. The maximum exposed height of abutment on such an open Structure is no more than 1 metre measured from the deck soffit to the incline of the slope,
- Integral bank-seats supported on reinforced earth abutments were permitted only where approved by the Authority,
- The side slopes and verges below the plan area of bridges over the Project Road were paved with paving slabs,
- Bearing shelves at end supports were masked from view by provision of a reinforced concrete masking wall extending over the full width of the bearing shelf and continuing along the front face of the abutment. Gaps were provided in the masking wall to allow for access to bearings for inspection, maintenance and replacement; and
- Parapet beams on the abutments overhang the wing walls below by a minimum of 200mm.

Extensive examination of the River Suir Bridge was undertaken at the preliminary design stage. From the initial review of possible forms that the River Suir Bridge could take, two forms were chosen for detailed consideration and costing. These were;

1. girder bridge
2. cable stayed bridge

A review of the aesthetic considerations was undertaken in relation to the site and the various options. A number of drawings and coloured sketches were prepared and a physical model was made to assist with evaluation of the alternative structures – principally from a visual and aesthetic viewpoint. The aesthetically pleasing aspect of a cable stayed bridge together with other major considerations such as costings, construction techniques, environmental impacts etc. ultimately led to this type of structure being chosen for the River Suir Bridge.

Due consideration was then given to the precise form that this cable stayed structure would take and set conditions and details were formulated to form part of the PPP Contract, including;

- A cable stay bridge with an overall length of approximately 465m was required to carry the N25 over the River Suir
- The main spans were to be in the form of a cable stay bridge with stays in a modified fan arrangement and a single A-frame pylon with an approximate height of 100m above deck level. The pylon was placed to the south of the line of the Mean Low Water Springs
- Slender columns were designed and constructed to minimise obstruction to views along the river. Due to the alignment of the river's course there was a need to consider oblique views through the structure when designing the support arrangement
- The Design had to give consideration to aesthetically balanced span lengths (chosen in relation to the obstacles to be crossed, the height of the Structure above ground level and the topography of the ground below). Extensive retained embankments (exceeding 6 metres in height) were prohibited
- The single pylon was founded in the inter-tidal area on the south bank at approximate chainage reference 10610. The pier on the northern shore was to be no more than 10 metres to the south of the line of the Mean Low Water Springs. The 230 metre span which crosses the majority of the river and provides a navigational clearance height (aircraft) of 14 metres (over a channel biased to the north of the river) above 1.87m O.D. Malin Head over a width of 80 metres centred about approximate chainage 10+763. The final arrangement does not adversely impact on the hydraulics of the River Suir
- The cable stays are light colour.
- The aesthetics of the parapet edge beams, were to be designed to provide a consistent appearance throughout the full length of the Structure
- Special attention was given to the anchorages of the stays to the deck Structure to ensure that these were sensitively detailed in relation to the deck edge and not form unsightly projections
- Weathering steel was not used for exposed steelwork
- Structural steel and that of the cable stays were finished in colours as agreed with the Authority's Representative

Architectural lighting requirements for the Suir River cable-stay bridge also formed an important aspect of the aesthetics of the bridge. This architectural, or feature lighting, was designed and installed by specialist firm Lightwise-Iguzzini. The inner faces of the A-frame pylon are lit by feature lighting. Feature LED strip lighting has also been incorporated to the upper section, front and back faces of the main pylon.

5.11 Value Engineering

The tendering process permitted Tenderers to carry out a significant level of value engineering which is reflected in submitted tenders and the final offer accepted by the Authority. Further value engineering was undertaken in the course of the detail design undertaken during the construction stage. All Authority and PPP Co Variations issued during the Design and Construction Period were agreed to be cost neutral, with the exception of Authority's Construction Variation ACV03 as detailed in section 3.6.

5.12 Non Conformance Reports & 'Construction Risk'

The use of Non-Conformance Reports (NCR) within this contract was primarily made by members of the construction joint venture and their designers (WJV), although the Authority's Representative had the right to raise them directly. NCRs were generally raised for one of the three following reasons:-

- Work proceeding 'at risk' – i.e. works proceeding prior to receipt of an 'acknowledged status from the Authority's Representative. This occurred due to the late submission of design data by the PPP Co, or non-compliance with the Contract Construction Requirements (generally Schedule 4 of the Contract).
- Materials failure – the laboratory testing of materials often fails to keep pace with construction and results showing non compliance are received after work is undertaken. In this Contract few of the non compliances were significant, and after review of the NCR by the Designer the materials were approved for use.
- Workmanship – poor workmanship can, but rarely does, lead to works being dismantled or demolished. The most common effect is on the quality of the finishes and the quality of the visible areas. Adequate supervision and experienced operatives generally minimise this as a problem. The Authority's Site Representative's team assisted in identifying workmanship problems by the use of Surveillance reports which were processed rapidly and allowed the Contractor to remedy works that might have otherwise become the subject of an NCR.

Over the course of the Contract 859 NCRs were issued and at the date of this report one remains open requiring pending receipt of a letter from the Designer to confirm acceptance of a construction method. This number is relatively small for a project of this size and complexity but the timing of inspections and quick response to correcting errors kept this number down.

Throughout the Contract, the PPP Co applied for a number of Waivers from the Authority. These Waivers generally related to the PPP Co proceeding with Construction prior to the Acknowledgement of relevant Design Certificates. Whereas the Authority's Site Representatives would have monitored these works; relevant works undertaken prior to the Acknowledgement of the Design were at the PPP Co's own risk which would have been subject to corrective works had they differed from the Acknowledged Design.

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Also during Construction, the PPP Co had to liaise with third parties and undertake remedial works at their own cost. An example of this was flooding was reported near Mount Congrieve by the General Manager of Mount Congrieve to the Project Liaison Officer in 2008. The Authority's Site Representative then informed the PPP Co of this issue and the PPP Co undertook the required works at their own expense.

As is evident in these three cases the PPP Co had to manage these issues and undertake remedial works without any recourse to the Contract and the Authority. These demonstrated the risk transfer at the heart of the PPP concept as intended.

6. Conclusions

The need for the scheme was clearly established by reference to national and local policies and from specific studies which confirmed inherent problems on the existing network including capacity deficiencies, traffic congestion, sub-standard safety records and resultant negative impacts on local communities and regional accessibility. The confirmation of the need for the scheme formed the basis for the decision to proceed with the project. It is considered that this decision has been proven to be correct, and that the key objectives and expected benefits of the project have been realised.

This project was completed with an out turn cost which was 20.7% less than the Phase 5 estimated. However the actual traffic volume currently using the toll collection facility is less than the traffic predictions stated in the Toll Scheme documentation. However, in consideration of the long duration of the contract, with over 25 years remaining in the operation phase, it is perhaps not appropriate at this time (2012) to draw conclusions in respect of the current performance of the traffic compared to the traffic volume predictions given in the Toll Scheme documentation.

The project management and appraisal procedures adopted were in accordance with best practice applicable through the various stages and proved satisfactory. All phases of project planning and implementation complied with relevant Department of Finance, Department of Transport and NRA guidelines, and the necessary approvals were obtained from the NRA at the appropriate decision points. The project was executed and completed in accordance with the statutory processes and procurement requirements and identified risks were successfully managed.

Specific issues that arose during the project are discussed above. Particular lessons from the project that may be applicable to other projects include the following;

- There were few problems with land acquisition for the scheme, primarily due to the early appointment of a Project Liaison Officer who was responsible for addressing any issues as they came to light.
- Advance archaeological testing proved beneficial, as it permitted the discovery of the “large substantial and important archaeological site” exposed at Woodstown at BAFO stage, removing the potential for the PPP Co seeking to recover significant additional costs from the Authority.
- Where possible, accommodation works schedules should incorporate sufficient flexibility to permit changes to the design by the PPP Co Designer.
- Innovative drainage solutions were introduced on the scheme which have the potential to reduce future maintenance costs.
- Extensive discussion and negotiation was necessary for the purpose of agreeing commercial terms with the PPPCo on variations issued by the Authority during the Design and Construction period. It is therefore considered that every effort should be made to ensure that the Construction Requirements are future proofed, in so far as possible at tender stage, to provide for impending design standard changes or any other factors that may have an impact in the Construction Requirements so as to avoid the need for variations.

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Appendix A. Route Selection Report Non Technical Summary

NON-TECHNICAL SUMMARY

INTRODUCTION

This is a non-technical summary of the Route Selection Report for the proposed Waterford Bypass. It draws attention to the most important issues and provides information on other significant topics. Any topic which causes concern can be followed in greater detail in the main Route Selection Report. The Route Selection Report presents the outcome of the route selection process and provides a coherent summary of the issues which determined the selection of the proposed route.

The objective of the scheme is to provide an N25 bypass of Waterford City for through traffic while also catering for the needs of the city. The scheme extends from west of Kilmeaden in Co. Waterford to east of Slieverue in Co. Kilkenny. The need for this scheme has been recognised over many years. The N25 connects Cork to the port of Rosslare, via Waterford City. The existing route at Waterford goes right through the city travelling along the congested city quays and crossing the River Suir over an opening span bridge.

The Waterford Bypass has been identified in the National Development Plan 2000-2006 as a Public Private Partnership (PPP) scheme. This means that the scheme may be operated by a toll road. This issue is not considered further in this report, but will be examined in the EIS.

FEASIBILITY STUDY

A feasibility study for the Waterford Bypass was carried out to identify feasible routes and crossing locations, evaluate and quantify the costs and benefits associated with these schemes, recommend a new crossing and approach roads, and examine the justification of the scheme. A new crossing of the Suir in the Waterford area would impose costs on, and produce benefits for, the community at large. Such a crossing would be justified if the benefits that it produced exceeded their associated costs, and did so by more than would be the case for any alternative investment of the same funds.

Having assessed and evaluated a large number of networks a recommended road network was selected, taking account of economic rate of return, Waterford City traffic performance, National Primary Route traffic performance, outline environmental examination, and the projected development of Waterford City and environs. The recommended road network indicated a corridor which was to be further refined in the course of the preparation of the Route Selection Report.

METHODOLOGY

To make effective comparison of the route options, the study area was divided into four sectors as follows (see Figure 1.1):

- Kilmeaden Section:
Routes 1, 2, 5, 6, 8, 9, 13 and 17
- Western Section including the Western Bypass and Western Link:
one proposed route.

- Suir Crossing Section, including the River Suir Bridge, Granny Junction and Newrath Link:
Routes 1, 2 and 3.
- Northern Section:
Routes 1, 3 and 7.

The scope of the environmental assessment was based upon the statutory environmental topics defined in the EIA Regulations. Detailed descriptions of the methodologies followed for the various environmental assessment disciplines are provided in the main report.

PLANNING AND DEVELOPMENT POLICIES

A bypass of Waterford City has been envisaged for some time now. The importance of the N25, Rosslare - Cork Route has been emphasised in the two most recent National Reports on National Roads and Development in the state - the *National Road Needs Study* published in 1998 by the National Roads Authority, and the *National Development Plan 2000-2006* published by the Government in 1999. The need for a Waterford City Bypass and second river crossing has also been included in the Development plans of all three local authorities concerned - Waterford Corporation, Waterford County Council and Kilkenny County Council. All three of the relevant Development Plans concerned contain specific reference to the proposed bypass and second river crossing.

PUBLIC CONSULTATION

A preliminary public consultation was held in City Hall, Waterford in July 1997. The route corridor, as recommended by the feasibility study, was displayed for the public's information.

Between 20 July and 26 July 1998, Waterford County Council, Waterford Corporation and Kilkenny County Council held a public exhibition in Waterford. The exhibition included a presentation to a joint meeting of the elected members of the three local authorities and display boards with information about the development of the scheme, plans of the proposed route options, artistic impressions of bridge designs and information about environmental constraints. Routes 9, 13 and 17 in the Kilmeaden section were not shown at this exhibition, as these routes were only drawn-up following the exhibition.

It is estimated that around 1,000 people attended the exhibition over the display period. Residents who attended were invited to complete a questionnaire which asked respondents to list their preferences for the various route options on display. It also asked respondents to rank the importance of various potential impacts of the scheme and for opinions on factors requiring special consideration in selection and design of the route. The overall preferred routes by the general public for each sector were as follows:

Section	Preferred Route (% in favour)	% in favour of only route option	No Preferences
Kilmeaden Section	Route 2 (18%)	-	53
Western Link	-	49%	42
Suir Crossing - route	Route 1 (33%)	-	42%
Suir Crossing - bridge type	High level cable stay (45%)	-	31%
Newrath Link	-	53	41
Northern Section	Route 7 (26%)	-	52%

There was, however, a high level of no preferences (40-50%), and locals living in each section often showed different preferences to the overall preference. Improvement of traffic conditions and impacts on people living near the route were ranked as the most important potential impacts.

Consultations with concerned groups continued after the public consultation in July 1998. These included consultations with individual landowners, as well as concerned residents groups. Further routes were examined as a result of the consultation process and amendments to original proposals were made. Having taken account of the concerns of all interested parties, and accommodated them where possible and feasible, one option from each section was selected. The recommended route was then presented to the three authorities on the 26th of July 1999 and put on public display for one month. At the end of the display period, two public information days were held. Further examination of the recommended route was necessary as a result of submissions received following the information days. This resulted in modifications to the previously recommended route in the Kilmeaden area and further consultations. The resulting route was presented to Waterford County Council on 10th July 2000.

EXISTING CONDITIONS

Descriptions of the existing traffic, engineering and accident conditions along the existing N25, and of the existing environmental conditions along the bypass study corridor are provided in the main report. These are used as a baseline against which the potential impacts of the various route options can be assessed.

Traffic

Traffic flows (AADT) on each of the National Primary Routes leading to Waterford:

N25 Rice Bridge	38,857 (1999)	N9 Dunkitt	5,924 (1998)
N25 Butlerstown	9,431 (1998)	N9 Dunkitt	5,924 (1998)
N25 Slieverue	11,042 (1998)	N24 Grannagh Castle	7,037 (1998)

Engineering

The existing N25 is of a highly variable standard, in both horizontal and vertical alignment. In several places, sub-standard alignments result in reduced sight distances and capacities. There are also a large number of junctions and house entrances.

Accidents

Between 1994 and 1998 a total of 13 fatal injury, and 33 serious injury accidents occurred on the relevant sections of the N25, N9 and N24. These were concentrated, in particular, within Waterford City.

Human Environment

The main settlements in the study corridor are the villages of Kilmeaden and Old Kilmeaden in the Kilmeaden section, ribbon development along the existing N9 and N24 in the Suir Crossing section and the village of Slieverue in the Northern section. In addition, clusters of residential development occur along minor roads throughout the study corridor.

In the Kilmeaden section, the old demesnes of Mount Congreve and Whitfield Court provide a variety of recreational/amenity resources. The disused Waterford-Dungarvan railway line runs through the Kilmeaden and Western sections and provides an informal walking route. It is listed in the Waterford City Development Plan as a Riverside Walk, and there are plans to develop a tourist railway along this route.

Agriculture

Farms along the route corridor predominantly specialise in dairy, beef or mixed grazing. Many farmers operate a mixed system of farming on their lands. Thus, while no specialist tillage farming occurs along the route corridor, various crops, in particular Wheat, Oats and Barley, are grown.

Ecology

The River Suir has been proposed as a candidate Special Area of Conservation (cSAC) under the Habitats Directive (92/43/EEC) due, in part, to the occurrence in the Suir of spawning populations of Twaite Shad and Sea Lamprey. In addition, Smelt (an Irish Red Data species) occurs in the lower Suir estuary. None of these fish species are known to, or considered likely to, spawn in the section of the River Suir within the study area.

One proposed Natural Heritage Area, Grannyferry pNHA, lies within the study area. This pNHA holds two sites for Meadow Barley, a threatened plant species protected under the Flora Protection Order, 1999; two further sites for this species occur in the study area. These sites are all of national importance due to their populations of this plant species.

Other areas of ecological constraint, of local or regional importance, occur at various locations in the study corridor, but particularly along the Blackwater and its tributary in the Suir Crossing section. These comprise mainly areas of semi-natural wetland habitat, and, of generally lesser importance, areas of woodland and scrub.

Geological Heritage

The only known features of geological heritage importance within the route corridor occur in the vicinity of the Suir crossing. Grannyquarries are an Area of Scientific Interest of local importance. The Ballyvergin Shale Formation is exposed in the cliffs along the north bank of the River Suir adjoining the quarries. This is an important marker horizon which is rarely exposed in outcrop.

Hydrogeology

A Groundwater Protection Scheme has been prepared for County Waterford and this indicates that the Kilmeaden sections and parts of the Western and Suir Crossing sections traverse classified as Regionally Important and Locally Important and as Highly or Extremely Vulnerable. A Groundwater Protection Scheme has not yet been prepared for County Kilkenny so similar information was not available for the study corridor north of the River Suir. A review of the aquifers within the route corridor will be carried out as part of the EIS. These classifications refer to the value of the aquifer as a resource and the susceptibility of the aquifer to pollution. The

- Ordinary landscape.
- Poor landscape.

The *Highest Quality Landscapes* are of an ‘awe inspiring’ or ‘sublime’ nature and include Mount Congreve, the ‘Suir Loop’, and the River Suir as viewed to the south west from Granny Castle. The *Very Attractive Landscapes* are of high value nationally and include the shoreline areas along the River Suir, the woodland areas at Dooneen and Powersknock, the Blackwater valley and the demesnes at Whitfield Court, Carriganore and Gracedieu. The *Good Landscapes* are areas which, although still attractive, have less significant landscape features and contain more intrusive elements. This category covers the majority of the remnant areas of the undulating lowland agricultural land. The *Ordinary Landscapes* are the built up areas within the Kilmeaden area, including the Waterford Creamery facilities, storage yards and linear residential developments along the roads. No *Poor Landscapes* were identified within the study area.

Cultural Heritage

The archaeology of the study area is characterised by a significant range of site-types. The surviving upstanding monuments show concentrations of site types dating from the Bronze Age and the Medieval period, respectively. The earliest surviving site types date from the Bronze Age. A number of fulachta fiadha (ancient cooking sites) are scattered throughout the study area and some fine examples of standing stones, one of the most easily recognisable Bronze Age monuments, also occur. There are many ringforts of the Early Christian Period still surviving in the area. Other sites of this period include a number of multi-period ecclesiastical centres. As this area lies close to the important medieval centre of Waterford, it is likely that earthen defensive features such as moated sites are present in the landscape. Later medieval strongholds such as castles and tower houses are present in the area. Both Kilmeaden Castle and Granny Castle were originally seats of the le Poer family.

From the post medieval period there are many fine country houses, vernacular cottages, industrial buildings and other structures, many of which are in good condition and show continuity of use. These are listed in the statutory development plans. In addition to these listed features, the walled garden at Mount Congreve includes a large Georgian (18th century) glasshouse/greenhouse; a glasshouse/greenhouse of this date and size is extremely rare in Ireland. Another unlisted site of architectural importance are the gates and gate lodge at Whitfield Court.

PROPOSED FACILITY

The determination of the type of facility to be provided depended largely on the projection of design year traffic flows and the comparison of these traffic flows with calculated capacities of various road types. The main issue was whether the facility should be dual or single carriageway.

The predicted daily traffic volumes (AADT) for the Waterford Bypass in 2025 are as follows:

Kilmeaden Bypass	14,629
Western Bypass/Suir River Crossing	35,237
Northern Bypass	18,495
Western Link	31,918

In November 1999, consultants were employed to address these issues and a more detailed comparison of Routes 9 and 17 was carried out. This analysis established that there was scope for modifying the two routes to reduce their impacts and that further investigation of the key issues was required. Therefore, modified versions of these routes were developed, and a further analysis was carried out, incorporating further studies of key issues. Following completion of the further studies, and a review of the modified routes, a clear preference for the modified Route 9 was established.

Mount Congreve Gardens are of international importance due to their scale, history and range of collection of plants in the garden. The microclimate conditions found at the site are ideal for the range of varieties and tender species grown there. Therefore, while neither Route 9 modified or Route 17 modified directly impact the gardens through loss of ornamental plants during construction, it is the indirect impacts from loss of trees and effects on microclimate therein, and also related to cuttings and embankments, which provide the greatest risk for the gardens. When the plant collections and gardens of Mount Congreve are evaluated against the proposals, the preferred route is modified Route 9 due to the fact that this route has no impact on historic landscape or on garden features such as driveway, walled garden, walks etc; much less impact on tree belt loss leading to less risk of cumulative and residual tree loss; and no impacts predicted on the microclimate features of importance to Mount Congreve gardens.

While modified Route 9 is located nearer to properties at Dooneen than Route 17, none of the properties experience noise increases which would be at or above intervention levels. Further, with an advance earth bund and advance screen planting the visual impacts of Route 9 are significantly reduced. Route 17 has wider visual and landscape impacts including along the River Suir where additional properties would be affected on the northern bank. The adverse visual impacts of Route 17 are considered to be much more difficult to mitigate than any arising from Route 9.

From the above comparison, the modified Route 9 emerged as the preferred option. Some concerns remained, however, about impacts at specific locations. In order to address some of these concerns, further modifications of this route were developed, and the resulting alignment has been called Route 18. Compared to modified Route 9, Route 18 has reduced impacts on private residential gardens and a recreation/amenity feature (Killoteran Riding School), and has reduced noise impacts, but has increased visual impact on one residential property. Therefore, Route 18 has been selected as the preferred route.

WESTERN SECTION

One proposed route was put forward for the Western Bypass and Western Link (Figure 9.1.1). In general, this route involves few engineering or environmental considerations of major significance. The most significant issues are:

- the construction of a roundabout on the existing N25 would cause some disruption to traffic (Construction Risk/Buildability).
- the Western Link would cause severance impacts to pedestrians using the Old Kilmeaden Road (Local Community).
- the Western Bypass would run along part of the old Waterford-Dungarvan railway line interfering with its use as a walking route and its projected development as a tourist railway (Local Community and Recreation/Amenity).

- the proposed route would cause significant impacts to 13 agricultural holdings.

The significant environmental impacts identified are either common to any route alignment in this section, or can be mitigated. Therefore, these routes were selected as the preferred routes for the Western Bypass and Western Link. The proposed route will be designed to facilitate the future use of the Waterford-Dungarvan railway line as a tourist railway line and/or amenity walking route.

SUIR CROSSING SECTION

Three horizontal alignment options were assessed for this section: Route 1, Route 2 (single junction and two junction variants) and Route 3. Five vertical alignment options were also assessed: Route 1 High Level, Route 1 Low Level, Route 2 High Level, Route 2 Medium Level and Route 3 High Level (see Figure 10.1.1). The major considerations in this section included:

- road safety at the major interchange required to connect three National Primary routes (Road Safety).
- creating the optimum connectivity for traffic on the three National Primary routes (Journey Length).
- adverse ground conditions along the alignment of Route 1, north of the crossing (Ground Conditions and Construction Risk/Buildability).
- the requirement, or otherwise, to maintain navigation for commercial shipping upstream of the proposed crossing (Navigation Clearance).
- impacts of the various options on residential property and community severance (Local Community, Noise and Landscape).
- the relative impacts of the various options on agricultural holdings (Agriculture).
- the impacts of Routes 2 and 3 on the Grannyferry proposed Natural Heritage Area, and populations of the protected plant species, Meadow Barley (Ecology).
- the impacts of the crossing options on the landscape quality of the Suir valley and the protected view at Granny Castle (Recreation/Amenity and Landscape).

Engineering considerations indicated a clear preference for Route 2, over the other two routes considered, due to: ground conditions, road safety, connectivity, navigation clearance and construction costs. This route was selected as the preferred route. Due to the engineering considerations and the large number of environmental constraints in this area, it was not possible to select a route which avoided significant potential environmental impacts. The preferred route, Route 2, has significant potential impacts on a proposed Natural Heritage Area and a protected plant species. Consequently, a detailed mitigation/compensation strategy for Route 2 has been developed in consultation with the National Parks and Wildlife.

NORTHERN BYPASS

Three options were assessed for this section: Routes 1, 3 and 7 (see Figure 11.11.1). The major considerations in this section included:

- creating optimum journey lengths from the N25 to the Port Road junction (Journey Length)
- the fact that Route 1 does not bypass the village of Slieverue (Road Safety and Local Community).
- the requirement for an alignment at the eastern end of the route which would achieve continuity of line of the N25 for future realignment (Construction Risk/Buildability).

- the impacts of the various options on residential property and community severance (Local Community, Noise and Landscape).
- the relative impacts of the various options on agricultural holdings (Agriculture).
- the impacts of the various route options on attractive rural landscape (Landscape).
- the impacts of Route 3 on a Kiln at Luffany and the impact of Route 7 on a stone row at Airmount Cross (Cultural Heritage).

There was no clear preference for any particular route on environmental grounds in this section. Route 7 was selected as the preferred route on engineering grounds for the following reasons: it bypasses the village of Slieverue; it is the best option for port traffic; and it would allow future grade separation of the tie-in with the existing N25 and continuity of the line.

THE PREFERRED ROUTE

The preferred route is shown in Figure 12.3.1.

Appendix B. Close Out Report

transport21
progress in motion



N25 Waterford Bypass

Close Out Report

Nov 2012



Issue and revision record

Revision	Date	Originator	Checker	Approver	Description
-	April 2010	██████	██	██	Final
1	April 2011	██████	██████	██	Final
2	Dec 2012	██████	██████	██	Final

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Appendix I: General Ledger and AGRESSO Details _____ Error! Bookmark not defined.

1. Introduction

1.1 NRA Project Reference No.

NRA Project Reference No.: **WB/99/110**

1.2 Scheme Description

The N25 Waterford Bypass consists of a 16.3 km dual carriageway bypass of Waterford City, 9.5 km of major link roads and an additional 13 km of side roads. It includes a 465 metre long dual carriageway cable-stayed bridge over the River Suir (with a 230m main span), plus a number of major viaduct and grade separated interchange structures totalling over 50 bridges. In brief the scheme consisted of:

- 16.3 km Dual Carriageway (Mainline) between Kilmeaden Co Waterford (to the West) and Luffany Co Kilkenny (to the East).
- 2.8 km Dual Carriageway including Quarry Link, N9 Link and Slieverue Link providing connection between Mainline and the N24 (Limerick), N9 (Dublin) and the N29 (Waterford Port).
- 3.5 km of Urban Dual Carriageway including the Western Link 1 and the Newrath Links 1 & 2, providing connection from Mainline to Waterford City.
- 3.2 km of Std Single Carriageway forming tie-ins between the existing N25 N24 and N29.
- Five At Grade Junctions, at Carrick Road, Luffany and Slieverue forming connections between the Mainline and the existing N25 and N29, at Quarry forming a connection with the M9, and a connection to the WIT campus on the Western Link.
- Two Grade Separated Junctions, at Knockhouse Upper (Western Link Jnct) and at Grannagh (Grannagh Jnct), connect the mainline to the Western Link south of the river and to the N24, the N9 (M9) and the Newrath Link north of the River Suir.
- 13 km of local road connections.
- The construction of in excess of 60 principal Structures including 5 viaduct structures, 10 overbridges, 5 road underbridges, 3 railway underbridges, 3 river underbridges and 8 accommodation underpasses
- The construction of a 465m long Cable Stayed bridge with a main span of 230 carrying the Mainline across the River Suir.
- Toll Plaza comprising Administration Building, Toll Plaza Canopy & Tunnel and associated Toll Collection System, located in Gracedieu.
- Diversion of various Services, Landscaping, Accommodation Works and the relocation of a section of the Waterford & Suir Valley Tourist Rail line.

In 1999 following a Government announcement about Public Private Partnership (PPP) the Waterford Bypass project was specifically earmarked as a PPP Scheme and would include hard tolling.

1.3 Main line length and Cross-section type

Waterford Bypass Mainline length and Cross-section type

Road Name	Road Classification	Road Name	Road Cross Section to NRA TD 27/00	Approx Road Length (km)
N25 Mainline	National	N25	Standard Dual (D2AP)	16.3

1.4 Other Roads length and Cross-section type

Waterford Bypass Other Roads length and Cross-section type

Road Name	Road Classification	Road Name	Road Cross Section to NRA TD 27/00	Approx Road Length (km)
Western Link 1	Regional	R710	Urban Dual (D2AP) Table 5, Central Reserve 2.6m wide	1.135
Western tie in	National	N25	Standard Single (S2)	1.050
R 680 Carrick road tie-in	Regional	R680	Reduced Single (S2) Table 3	0.510
Matthews Cross realignment	County	L4020	6.0 metres carriageway	0.300
Kilmeaden Village Link Road	Regional	R680	Reduced Single (S2)	0.490
Killmeaden Village Tie in	Regional	R680	Standard Single (S2) Table 3	0.120
Lacka Road	County	L8029	5.5 metres carriageway	0.830
N24 Tie-In	National	N24	Standard Single (S2)	0.660
M9 Link	National	M9	Standard Dual (D2AP)	1.650
N9 Tie-in	National	N9	Standard Single (S2)	0.500
Quarry Link	National	N9	Standard Dual (D2AP)	0.520
Newrath Link Section 1	Regional	R861	Urban Dual (D2AP)	1.020
Newrath Link Section 2	Regional	R448	Urban Dual (D2AP) Table 5, central reserve 3.0m wide	1.165
Newrath East Link Road	County	L3408	Reduced Single (S2)	0.840
Dunkitt Road	County	LP3406	6.7 metres carriageway	0.410
Kilmacow Road. N9 Re-alignments	County	LP3401	6.7 metres carriageway	0.460

Road Name	Road Classification	Road Name	Road Cross Section to NRA TD 27/00	Approx Road Length (km)
Kilmacow Road. Junction Realignment	County	LP3401	6.7 metres carriageway	0.450
Castle Access 1	County	-	6.0 metres carriageway	0.160
Castle Access 2	County	-	6.0 metres carriageway	0.090
Ferry Underpass	County	-	5.0 metres carriageway	0.390
Granny Bridge Access Road	County	R448	Reduced Single	0.320
Newrath Tie In	County	L3408	6.0 metres carriageway	0.200
Existing N9 re-alignment	County	L3401	7.5 metres carriageway	0.665
Mullinabro Road Tie in	County	LP3408	6.7 metres carriageway	0.410
Cloone Road Section 1	County	LP3410	6.0 metres carriageway	0.640
Cloone Road Section 2	County	LP3410	6.0 metres carriageway	0.885
Ballyrobin Road	County	LP3409	6.0 metres carriageway	0.440
Nicholastown Road	County	LP3406	6.0 metres carriageway	0.560
Airmount Bridge	County	L7469	6.0 metres carriageway	0.180
N25 New Ross Road Tie In	National	N25	Standard Single	0.700
Slieverue Link	National	N29	Standard Dual (D2AP)	0.665
N29 Port Road Tie-In	National	N29	Standard Single (S2)	0.780
Ferry Bank Tie-In	Regional	R711	Standard Single (S2)	0.200
Slieverue Roundabout Tie In	County	LP3411	7.0 metres carriageway	0.05
Woodstown Site Access Road	County	L4412	6.0 metres carriageway	0.383
W.I.T Waterfront Access road	County	-	5.0m Carriageway	0.197
W.I.T Entrance	County	-	Standard Dual (D2AP)	0.040
Luffany Tie-in	County	-	7.0 metres carriageway	0.080
Local Road at Bawnfune	County	L4035	6.0 metres carriageway	0.220
Old Kilmeaden Road	County	L4411	7.3 metres carriageway	0.426

1.5 Waterford Traffic Projections

The most recent projections (in AADT Vehicles) are as shown below. This modelling and analysis was carried out in September 2001. The projections were revisited on a number of occasions subsequently, however, each time it was considered that there was no need to amend the projections significantly and they continued to be used for EIS evaluations etc. The projections have not been widely circulated as they were deemed to be confidential for the purposes of the PPP Tender. They should continue to be treated in confidence.

Toll 100p	Revised Analysis (September 2001)				
		A	B	C	D
Scenario	YEAR	KILMEADAN	NEW CROSSING	NORTHERN BYPASS	RICE BRIDGE
LOW	2005	6492	6458	4991	29395
	2015	7587	8146	5509	34278
	2025	9639	13622	8015	39922
INTER	2005	7865	8613	6304	36926
	2015	10569	18846	11788	45268
	2025	13468	28862	16056	49241
HIGH	2005	8004	9686	7042	38556
	2015	11482	23470	14285	47731
	2025	15673	36496	20441	52149

2. Chronology of Project Key Dates

2.1 Timeline of key milestones

Milestone	Date	Phase
Appointment of Consultant (Mott MacDonald)	March 1996	Phase 3
Waterford Second River Crossing Stage 1 Final Report	May 1997	Phase 3
Preliminary Public Consultation	July 1997	Phase 3
Public Exhibition	July 1998	Phase 3
N25 Waterford Bypass Route Selection Report Published	November 1999	Phase 3
Section 59 Agreement between Waterford City Council, Waterford County Council & Kilkenny County Council	March 2000	
N25 Waterford Bypass second River Crossing Bridge Preliminary Report.	February 2001	Phase 4
N25 Waterford Bypass –Environmental Impact Statement (EIS)	February 2001	Phase 4
N25 Waterford Bypass – Compulsory Purchase Order 2001	March 2001	Phase 4
Bridge Order Public Inquiry	12th June 2001 & September 2001	Phase 4
N25 Waterford Bypass Oral Hearing	August 2001 & November 2001 & July 2002	Phase 4
PPP Tender Issue	September 2001	Phase 5
An Bord Pleanala Additional Info request	February 2002	Phase 4
N25 Waterford Bypass Archaeological Investigation: Contract 1. Commencement of Works.	February 2002	Phase 5
N25 Waterford Bypass Archaeological Investigation: Contract 2. Commencement of Works.	February 2002	Phase 5
PPP Tender Return	March 2002	Phase 5
N25 Waterford Bypass Additional Information requested by An Bord Pleanala Issued (Report & Drawings)	May 2002	Phase 4
An Bord Pleanala Hearing - Additional Info	July 2002	Phase 4
PPP BAFO shortlisting announced	October 2002	Phase 5
An Bord Pleanala CPO Confirmation and Orders Approved	18th October 2002	Phase 4
Bridge Order Signed	13th January 2003	Phase 4
N25 Waterford Bypass - Supplementary Ground Investigations. Completion of Works.	March 2003	Phase 5
PPP BAFO Invitation	July 2003	Phase 5
Foreshore Lease issued	21 st August 2003	Phase 4
Section 85 Agreement between Waterford City Council & Waterford County Council	September 2003	
N25 Waterford Bypass Advanced Works Contract – Butlerstown Roundabout. Tender Returns.	October 2003	Phase 5

Milestone	Date	Phase
N25 Waterford Bypass Woodstown 6 - Proposal for preservation In Situ of Archaeological Remains	January 2004	Phase 5
N25 Waterford Bypass Archaeological Investigation: Contract 3. Commencement of Works.	January 2004	Phase 5
N25 Waterford Bypass Advanced Works Contract – Butlerstown Roundabout. Commencement of Works.	16th February 2004	Phase 5
N25 Waterford Bypass Investigation of Alternative Routes at Woodstown.	November 2004	Phase 5
N25 Waterford Bypass Advanced Works Contract – Butlerstown Roundabout. Completion of Works.	20th February 2005	Phase 5
Draft N25 Waterford Bypass PPP Alternative Route at Woodstown Design Report	June 2005	Phase 3/4
N25 Waterford Bypass – Alternative Routes project at Woodstown –Environmental Assessment of Route Options	June 2005	Phase 3/4
N25 Waterford Bypass – Alternative Route at Woodstown Ground Investigations Contract.	July 2005	Phase 3/4
Section 85 Agreement between Waterford City Council & Waterford County Council	July 2005	
N25 Waterford Bypass Waterford Crossing Alternative Route Site Investigation at Woodstown Factual Report	September 2005	Phase 3/4
N25 Waterford Bypass – Alternative Route at Woodstown Ground Investigations. Completion of Works.	4th October 2005	Phase 3/4
N25 Waterford Bypass Alternative Route at Woodstown Geotechnical Interpretative Report.	October 2005	Phase 3/4
N25 Waterford City Bypass – Route Selection Report in the vicinity of the Woodstown Archaeological Site.	October 2005	Phase 3/4
N25 Waterford Bypass Advanced Works Contract – Old Kilmeaden Road Roundabout. Tender Returns	October 2005	Phase 5
Route Selection in the Vicinity of Woodstown Archaeological Site – Additional Information Requested by An Bord Pleanala Drawings	November 2005	Phase 3/4
N25 Waterford Bypass Advanced Works Contract - Stone Faced Wall at Adamstown. Tender Returns	November 2005	Phase 5
PPP BAFO Return	November 2005	Phase 5
N25 Waterford Bypass Advanced Works Contract – Old Kilmeaden Road Roundabout. Commencement of Works.	16th January 2006	Phase 5
Alternative Route Test Trenching started.	February 2006	Phase 5
Contract signing/Contract Award	21st April 2006	Phase 5
Design & Construction Commencement	21st April 2006	Phase 6

Milestone	Date	Phase
N25 Waterford Bypass Advanced Works Contract - Stone Faced Wall at Adamstown. Commencement of Works.	May 2006	Phase 5
N25 Waterford Bypass Alt Route – Compulsory Purchase Order 2006	June 2006	Phase 4
N25 Waterford Bypass – Woodstown Alternative Route EIS	June 2006	Phase 4
N25 Waterford Bypass Advanced Works Contract – Old Kilmeaden Road Roundabout. Completion of Works.	10th August 2006	Phase 5
N25 Waterford Bypass Advanced Works Contract - Stone Faced Wall at Adamstown. Completion of Works.	9th October 2006	Phase 5
N25 Waterford Bypass Woodstown Alternative Route – Additional Information Requested by An Bord Pleanala.	October 2006	Phase 4
N25 Waterford Bypass Woodstown Alternative Route Oral Hearing	October & November 2006	Phase 4
An Bord Pleanala Alternative Route Approval	February 2007	Phase 4
N25 Waterford Bypass Advanced Works Contract - Stone Faced Wall at Bawnfunne. Tender Returns	March 2007	Phase 5
N25 Waterford Bypass Advanced Works Contract - Stone Faced Wall at Bawnfunne. Commencement of Works.	13th September 2007	Phase 5
N25 Waterford Bypass Advanced Works Contract - Stone Faced Wall at Bawnfunne. Completion of Works.	10th October 2007	Phase 5
N25 Waterford Bypass Advance works contract - Landscaping at Dooneen and Western Link 2. Tender Returns	February 2008	Phase 5
N25 Waterford Bypass Advance works contract - Landscaping at Dooneen and Western Link 2. Commencement of Works.	December 2008	Phase 5
N25 Waterford Bypass Advance works contract - Landscaping at Dooneen and Western Link 2. Substantial Completion of Works.	January 2009	Phase 5
Official opening of the N25 Waterford Bypass (Issue of Permit to Use/ Taking Over Certificate for 14 roads of the Waterford Bypass including the N25 Mainline)	19th October 2009	Phase 6
Issue of Taking Over Certificate for a further 12 roads	12th November 2009	Phase 6
Issue of Taking Over Certificate for a further 6 roads	22nd December 2009	Phase 6
Target Completion Date of Bypass	20th August 2010	Phase 6

3. Planning and Design by LA/RDO

3.1 Local Authority

The N25 Waterford Bypass passes through three local authorities:

- Kilkenny County Council
- Waterford County Council
- Waterford City Council

A Section 59 Agreement was signed in March 2000 by the three authorities appointing Waterford City Council as the lead authority for the scheme.

In September 2003 a Section 85 Agreement was signed by Waterford City Council (lead authority) and Waterford County Council to facilitate the construction of the Butlerstown Roundabout.

In July 2005 a Section 85 Agreement was signed by Waterford City Council (lead authority) and Waterford County Council to facilitate the construction of the Old Kilmeaden Road Roundabout and Western Link Phase 1.

In March 2006 a Co-operation Agreement was signed by the three local authorities and the NRA (PPP section). This agreement allowed the NRA to assume the role of lead authority for the procurement and construction of the N25 Waterford Bypass by means of a Public Private Partnership (PPP). Waterford City Council continued its role as lead authority for all other aspects of the schemes including archaeology, service diversions, advance works contracts, etc.

3.2 Regional Design Office

The project management for N25 Waterford Bypass was carried out under the direction of

██████████
Senior Engineer,
Tramore House Regional Design Office,
Pond Road,
Tramore,
Co. Waterford.

The Design Office Project Manager responsible for the scheme was;

████████████████████
██
████████████████████

3.3 Designers

The scheme design and assessment was carried out jointly by:

- Tramore House Regional Design Office (Roads and Traffic Issues); and
- Mott MacDonald (Structural, Roads, Environmental and Traffic Issues).

RPS Consultants was appointed by Mott McDonald to carry out the environmental assessment for the route selection and EIS. Contributions to the environmental assessment sections were also made by Aquatic Services Unit (Water Quality and Fisheries), F.R. Mark & Associates (Noise), [REDACTED] (Archaeology), [REDACTED] (Botany), [REDACTED] of the University of Dublin (Genetics of Meadow Barley), [REDACTED] (Hydrogeology of Mount Congreve), [REDACTED] (Mount Congreve demesne), Arborist Associates Td. (Tree Survey of Mount Congreve) and [REDACTED] (Microclimate of Mount Congreve).

3.4 Local Authority/Regional Design Office Expenditure

Contract Name	Fees (Excl VAT)
Planning & Design, Project Management and NRA Project Archaeology Team	€ 3,110,577.88
[REDACTED]	€ 335,793.15
Statutory Process Costs including alternative route	€ 2,061,542.17
Advertising & miscellaneous costs	€ 313,483.18
TOTAL	€ 5,821,396.38

Note: * Post May 2006 costs associated with Project Liaison Officer were included in Site Supervision costs in Section 8 of this report.

4. Other Design Services

4.1 Consultancy Services Mott MacDonald

Contract Name	Fees (Incl. VAT)
N25 Waterford Second River Crossing Feasibility Study Stage 1	
N25 Waterford Bypass Stages 1B and 2	
N25 Waterford Bypass PPP Contract (2000-2006)	
N25 Waterford Bypass Advance Works Contract - Butlerstown Roundabout	
N25 Waterford Bypass Advance Works Contract - Old Kilmeaden Road Roundabout	
Non Project Road Signage Design	
Preparation of Vesting Orders	
TOTAL	€ 6,673,182.19

Note:

In May 2006 the services of Mott MacDonald were novated to the NRA to provide professional services in respect of monitoring the construction of the bypass. To date a further €3,782,106 has been expended by the NRA (PPP unit) in respect of services provided by Mott MacDonald.

4.2 Geotechnical Investigation Works

Contract Name	Final Certified Amount (Incl VAT)
████████████████████	€ 7,219.94
River Suir Bridge GI	€ 847,155.98
██████████	(IR£667,188.54)
████████████████████	
N25 Waterford Bypass –Site Investigation	€ 653,893.88
████████████████████	
Test Wells at Mount Congrieve Estate	€ 18,996.50
████████████████████	(IR14,960.44)
N25 Waterford Bypass - Alternative Route at Woodstown - Ground Investigations	€ 99,513.73
████████████████████	
████████████████████	
Compensation for Geotechnical Investigation Works	€ 129,789.15
TOTAL	€ 1,756,569.18

Note:

A supplementary Ground Investigations during Tender Period was carried out in September 2002. The fieldwork, laboratory testing and reporting was completed by ██████████. The cost of this work was €1,112,018.58. However, this cost was borne by the winning tenderer for the main contract (Celtic Roads Group-CRG) and recovered through PPP tender process.

4.3 Environmental Services

Contract Name	Final Certified Amount (Incl VAT)
[REDACTED]	€ 27,593.28
EIS & Meadow Barley Translocation at Gracedieu (RPS Consultants)	€ 153,793.02
Meadow Barley Translocation at Gracedieu [REDACTED]	€ 7,884.06
N25 Waterford Bypass – Badger Survey and Sett Removal at Carriganore Rock [REDACTED]	€ 16,405.08
TOTAL	€205,675.44

4.4 Topographical Surveys and Mapping

Contract Name	Final Certified Amount (Incl VAT)
Digital Mapping [REDACTED]	€ 23,845.72
Digital Groundmodel (10m grid) [REDACTED]	€ 4,050.47 (IR£3,190.00)
Groundmarkers [REDACTED]	€ 1,451.88 (IR£1,143.45)
Control Points on railway [REDACTED]	€ 7,743.38 (IR£6,098.40)
N25 Waterford Bypass Survey Control [REDACTED]	€ 12,125.93 (IR£9,549.93)
N25 Waterford Bypass Geodetic Survey [REDACTED]	€ 253,184.56 (IR£199,399.05)
Setting out fenceline at Sallypark Railyard [REDACTED]	€ 2,359.5
Survey of railtracks at Sallypark Railyard [REDACTED]	€ 4,840.00
Aerial Photography [REDACTED]	€ 15,077.63
Survey of Mount Congrieve shelter belt [REDACTED]	€ 17,430.96 (IR£13,728.00)
TOTAL	€ 342,110.03

4.5 Other Consultancy Services

Contract Name	Fees (Excl VAT)
N25 Waterford Bypass Models [REDACTED]	€ 82,869.98
Geotechnical Consultancy Service [REDACTED]	€ 119,102.50
N25 Waterford Bypass Advanced Works Contract – Old Kilmeaden Road Roundabout – Conciliator [REDACTED]	€ 24,749.55
Monitoring and Assessment of test wells at Mount Congrieve Estate [REDACTED]	€ 3,956.19
[REDACTED]	€ 3,264.81
N25 Existing Pavement Assessment (FWD) [REDACTED]	€ 12,444.70
N25 Waterford Bypass Road Safety Audit Stage 1 [REDACTED]	€ 819.67
[REDACTED]	€ 7,681.93
[REDACTED]	[REDACTED]
[REDACTED]	€ 1,815.00
TOTAL	€ 267,883.52

5. Archaeology

5.1 Archaeological Investigations

Waterford City Council procured three contracts for the provision of archaeological services on the N25 Waterford Bypass. The contracts were awarded following public advertisement in accordance with EU and national procurement rules.

The identification of an extensive Viking settlement site at Woodstown during pre-construction archaeological investigations on the approved route for the bypass in 2003 led to significant additional archaeological works. The Woodstown site was declared a National Monument by the Minister for the Environment, Heritage & Local Government in 2005 and the Minister directed Waterford City Council to identify an alternative route for the Bypass that would preserve the National Monument site.

Contract 2 (Archaeological Development Services Ltd) and Contract 3 (Headland Archaeology Ltd.) have been closed out. Archaeological Consultancy Services Ltd (Contract 1) has informed Waterford City Council that they have gone into voluntary liquidation.

Contract Name	Final Certified Amount (Incl VAT)
N25 Waterford Bypass Archaeological Investigation: Contract 1 [REDACTED]	€ 3,800,055.90
N25 Waterford Bypass (Woodstown Alternative Route test excavations) [REDACTED]	€ 123,101.67
N25 Waterford Bypass (Woodstown Alternative Route-Geophysical survey/Security at Woodstown)	€ 115,443.66
N25 Waterford Bypass Archaeological Investigation: Contract 2 [REDACTED]	€ 2,101,620.92
N25 Waterford Bypass Archaeological Investigation: Contract 3 [REDACTED]	€ 2,224,996.41
[REDACTED]	€ 9,317.00
Landscape & Geophysical Services	€ 9,272.60
[REDACTED]	€ 12,844.15
[REDACTED]	€ 7,768.78
[REDACTED]	€ 2,250.00
N25 Waterford Bypass Advanced Works Contract – Fencing of archaeological sites Alternative route [REDACTED]	€ 43,938.14
Fencing of Woodstown Viking Site [REDACTED]	€ 12,513.38
[REDACTED]	€ 1,159.79
Miscellaneous Works including grass cutting at Woodstown, removal of timbers from Dooneen, topsoiling/seeding at Bawnfune [REDACTED]	€ 66,673.39
Monitoring for fencing of Woodstown Site [REDACTED]	€ 1,405.24

6. Utility/Statutory Undertakers Works

6.1 Service Diversions

Contract Name	Final Certified Amount (Incl VAT)
ESB 110kV Diversion - Knockanagh (Conflict 3)	€ 222,000.00
ESB 110kV Diversion - Bawnfune (Alt Route) (Conflict 16)	€ 370,000.00
ESB 10kV Diversion #1- Bawnfune (Alt Route)	€ 22,196.97
ESB 10kV Diversion #2 - Bawnfune (Alt Route)	€ 3,162.00
ESB Miscellaneous Costs	€ 1,663.00
BGE Diversions - Dooneen	€ 1,505,106.09
BGE Diversion - Bawnfune (Alt Route)	€ 1,131,744.32
Eircom Diversion	€ 4,582.31
Eircom Diversion- Old Kilmeaden Road Roundabout	€ 80,874.35
TOTAL	€ 3,341,329.04

7. Advance Works Contracts

7.1 Advanced Works Contracts

Contract Name	Final Certified Amount (Incl VAT)
N25 Waterford Bypass Advanced Works Contract – Fencing of Survey Control Stations ██████████	€ 19,941.27 (IR€15,705)
Mullinabro Habitat Creation Translocation ██████████	€ 92,959.10
N25 Waterford Bypass Advanced Works Contract - Landscaping at Dooneen and Western Link 2. ██████████	€ 80,147.88
N25 Waterford Bypass Advanced Works Contract – Butlerstown Roundabout. ██████████	€ 1,353,487.49
N25 Waterford Bypass Advanced Works Contract – Miscellaneous Works. ██████████	€ 30,872.00
N25 Waterford Bypass Advanced Works Contract – Old Kilmeaden Road Roundabout. ██████████	€ 4,173,536.39
N25 Waterford Bypass Advanced Works Contract – Stone Faced Wall at Adamstown . ██████████	€ 190,003.75
N25 Waterford Bypass Advanced Works Contract – Stone Faced Wall at Bawnfune. ██████████	€ 84,207.11
N25 Waterford Bypass – Temporary Fencing and Hedgerow Clearance. ██████████	€ 410,258.28
N25 Waterford Bypass – Mulching and Disposal of material from Hedgerow Clearance. ██████████	€ 132,908.50
Erection and Removal of Temporary Pallisade fence at CIE goods yard Grannagh ██████████	€ 59,486.52
Various miscellaneous works	€ 17,652.28
TOTAL	€ 6,645,460.57

9. Site Supervision

9.1 Site Supervision

Butlerstown Roundabout

The construction of the N25 Butlerstown Roundabout was undertaken as an advance works contract with the agreement of the NRA. The construction of this scheme took place between February 2004 and February 2005 and it coincided with the construction of the R710 Waterford City Outer Bypass (Contracting Authority - Waterford City Council). It was agreed between NRA and Waterford City Council that the supervisory staff appointed for the R710 Waterford City Outer Bypass would also supervise the construction of the N25 Butlerstown Roundabout. No additional site staff was appointed nor was any expenditure incurred for site supervision in respect of the N25 Butlerstown Roundabout scheme.

Old Kilmeaden Road Roundabout

The construction the Old Kilmeaden Road Roundabout (including phase 1 of the Western Link) was procured as an advance works contract. Work commenced in January 2006 and was substantially completed in August 2006. Waterford City Council with the agreement of the NRA appointed the following site staff for the duration of the project:

- **1 No. Resident Engineers (RE)**
- **1 No. Clerk of Works**

Main Contract (PPP)

The Contract for the construction of the bypass was signed In April 2006 and construction work began on site immediately. The staffing structure agreed between NRA (PPP unit) and Waterford City Council was as follows:

- **Authority's Site Representative (ASR)**
- **3 No. Senior Resident Engineers (SRE)**
- **3 No. Resident Engineers (RE)**
- **1 No. Assistant Resident Engineer (ARE)**
- **1 No. Clerk of Works (CoW)**
- **1 No. Project Liaison Officer (PLO)**
- **2 No. Administration Staff**

The Authority's Site Representative was appointed by the NRA. The other supervisory staff positions were recruited and appointed by Waterford City Council. The total cost of Waterford City Council supervisory staff is listed below.

Local Authority Expenditure for Site Supervision

Year	Final Certified Amount (Incl VAT)
2006	€ 413,483.00
2007	€ 844,773.00
2008	€ 883,886.00
2009	€ 988,185.00
2010 /2011	€ 596,834.27
TOTAL	€ 3,727,161.27

The remaining site supervisory staff contracts are due to terminate in June 2010, however this is dependent on the completion of the outstanding works and remedying of defects by the Contractor

10. Land

10.1 Compulsory Purchase Order

The CPO/EIS the original route (CPO No. 1) for the N25 Waterford Bypass was published on 01/03/2001. Following a public hearing the CPO/EIS was approved by An Bord Pleanala on 18/10/2002. Notices to Treat were issued between February and June 2003.

As a result of the discovery of the Woodstown Viking Site the Minister for the Environment issued a direction to preserve the site and this required an amendment to the route of the bypass between Dooneen and Carriganore. The CPO/EIS for the Alternative Route (CPO No. 2) was published on 26/06/2006 and was approved by An Bord Pleanala in February 2007. Notices to Teat for the Alternate Route were issued in March 2007.

10.2 Land Required

The land area required for the construction of the N25 Waterford Bypass is as follows:

Reference	Area of Land Required
CPO No.1 (Original Route)	274 Ha (677 acres)
CPO No. 2 (Alternative Route)	25 Ha (62 acres)
Total Area of Land Required	299 Ha (739 acres)

10.3 Estimate of Land Compensation Cost

The estimated cost of lands and properties to be acquired for the construction of the N25 Waterford Bypass as of January 2006 was as follows:

Reference	Estimated Expenditure
CPO No.1 (Original Route)	€ 38,001,691.00
CPO No. 2 (Alternative Route)	€ 9,999,934.00
Total Estimated Expenditure	€ 48,001,625.00

10.4 Actual Expenditure (to 30/11/2012)

In total there were 220 plots to be acquired. 1 no. new claim was received in 2010 and this remains to be settled in 2012. All other claims have been settled by agreement. The expenditure for lands and properties acquired for the construction of the N25 Waterford Bypass up to 30/11/2012 is summarised as follows:

Reference	Expenditure
Total Land and Property Compensation	€ 47,301,527.80
Total Actual Expenditure	€ 47,301,527.80

10.5

[REDACTED]	[REDACTED]

[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]

[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]

10.6

Total Compensation Expenditure to 30/11/2012

Reference	Expenditure
[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]
Total Expenditure	€49,854,027.80

10.7

Estimated Outstanding Expenditure

There is one new claim received in 2010 yet to be settled. The value of the compensation claim has been agreed by both parties. Once the title to the lands in question is finalised the compensation will be paid.

[REDACTED]	[REDACTED]
------------	------------

Reference	Estimated Expenditure
[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]
Total Estimated Expenditure	€1,560,000.00

10.8 Lands for Disposal

As a result of the change to the route of the N25 Waterford Bypass to avoid the Woodstown Viking site there were a number of plots that were surplus to requirements. A number of these have been disposed of by Waterford City Council as follows:

- 1 No. Dwelling house at Killoteran
- Plot No. [REDACTED] returned to land owner
- Plot No. [REDACTED] returned to landowner

There may be other small parcels of land that are surplus to requirement to be determined upon completion of the works.

11. Final Scheme Cost

Section	Area of Land Required
Local Authority & Regional Design Office	€ 5,821,396.38
Other Design Services	
Mott MacDonald	€ 6,673,182.19
Ground Investigation Works	€ 1,756,569.18
Environmental Services	€ 205,675.44
Topographical Surveys & Mapping	€ 342,110.03
Other Consultancy Services	€ 267,883.52
Total	€ 9,245,420.36
Archaeology	€ 8,556,746.52
Utility & Statutory Undertakers Works	€ 3,341,329.04
Advance Works Contracts & Residual Network	
Advance Works	€ 6,645,460.57
Residual network	€ 2,769,466.81
Total	€ 9,414,927.38
Site Supervision	€ 3,727,161.27
Land	
Land	€47,301,527.80
Total	€49,854,027.80
Total Scheme Expenditure (To date)	€89,961,008.75

Estimated Outstanding Expenditure

Reference	Estimated Expenditure
Land Acquisition	€1,560,000.00
Total Estimated Expenditure	€1,560,000.00

M50 Upgrade

Post Project Review



December 2014

Erratum Sheet

Post Project Review reports - Corrections

The Post Project Review reports were not originally intended for an external audience. There are in some cases errors in the reports with such errors ranging from typographical errors to in a small number of cases incorrect statements or errors in interpretation of the data (which have been identified as a consequence of subsequent reviews). We suggest that the following errata are taken into account when reviewing these reports.

2. Scheme Conception

History of Toll Plaza (page 5)

In 1987, Dublin City Council entered into an Agreement with a private company, West-Link Toll Bridge Ltd

Should read

In 1987, Dublin County Council entered into an Agreement with a private company, West-Link Toll Bridge Ltd

Important Notice

This report has been prepared by AECOM Limited. It is based on information and explanations provided by the National Roads Authority and has been prepared for the sole use of the National Roads Authority.

This Post Project Review report contains certain information of a commercially sensitive nature and should be kept confidential. This report contains information relating to tenderer's pricing and information relevant to the State's approach to evaluation of value for money that the State may adopt in the future.

Release of certain information contained in the Post Project review Report, whether on foot of freedom of information request or otherwise, would likely impact negatively on the State's commercial interests and would accordingly, not be in the public interest. In the event that the recipient receives any request to disclose any information contained in the Post Project review report (whether pursuant to freedom of information legislation or otherwise), we would ask you to notify the National Roads Authority of this request prior to any disclosure being made so that our comments may be taken into account in any decision that might be taken in this regard.

M50 Upgrade

Post Project Review

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Executive Summary

The M50 Upgrade includes upgrading of 34km of the M50 between the M1 Interchange and the Sandyford Interchange. The works involved upgrading the mainline M50 to 3-lane motorway standard; upgrading of 10 interchanges/junctions; provision of an auxiliary lane carriageway between the M1 and Scholarstown; and removal of the West-Link Toll Plaza to be replaced with a fully free-flow electronic tolling facility.

Procurement of the scheme was carried out in three distinct phases. The first phase commenced in March 2006 and the final phase completed on schedule in October 2010.

Overall, the scheme was adequately planned in terms of the statutory procedures, appraisal and consultation.

The scheme objectives of improving access onto and off the motorway, increasing capacity on the motorway and reducing congestion levels have been achieved. The extent to which the scheme has contributed to the reduction of the congestion delays has been impacted both by the increased capacity resulting from additional lanes, as well as the overall reductions in traffic volumes owing to the significant recession which has materialised since 2008.

To date traffic volumes along the M50 are well below those forecast in the traffic modelling underpinning the Upgrade Scheme project appraisal. It is too early to tell what the traffic volume outturn will be over the 35 year project appraisal period. However, as the country returns to economic growth, traffic volume growth will gain momentum, as noted in the M50 Demand Management Study. Furthermore, the benefit to cost ratio of the project was 6:1; it is still likely, even with a sizeable shortfall of traffic in the future beyond that predicted in the appraisal, that the economic rate of return would still be significant.

1. Introduction

1.1. The Scheme

The need to upgrade the M50 was identified in a number of government policy documents including the National Development Plan and the Dublin Transportation Office's A Platform for Change Strategy 2006 – 2016. The M50 Upgrade Scheme comprised the:

- upgrading of 34km of the M50 mainline to dual 3-lane motorway standard between the M1 Interchange and the Sandyford Interchange;
- upgrading of ten interchanges/junctions along this length;
- provision of an additional auxiliary lane carriageway between the M1 and Scholarstown Interchange/Junction, to facilitate the merging and diverging of traffic between these junctions; and
- removal of the West-Link Toll Plaza, to be replaced on a phased basis with a fully free-flow electronic toll facility.

As part of the M50 Upgrade Scheme it was proposed that the mainline would be widened through the addition of a third lane in each direction which would generally be carried out within the then existing central median. The junctions along the M50 length were to undergo different levels of upgrading: the M1, N2, N3, N4 and N7 Junctions were to receive major upgrades to partial or full free-flow junctions; the Ballymount and Scholarstown Junctions were to be upgraded with additional bridges; while the Ballymun, N81 and Sandyford Junctions were to receive minor improvements such as the addition of free-flow left slip lanes. Pedestrian and cycle facilities were to be provided at each of the junctions to facilitate crossing the M50.

The proposal for procurement of the Upgrade Scheme was as follows:

- **Phase 1:** A Design & Build contract comprising the widening of almost 8 km of carriageway between N4 and Ballymount junctions and the upgrading of the N4, N7 and Ballymount junctions. This contract was awarded in 2006 and was due to be completed in 2008;
- **Phase 2:** A PPP comprising the widening of 24 km of the M50 from the M1 Junction to the intersection with the N3, and extending also from south of Ballymount Junction to the Sandyford Junction, including the upgrade of junctions along these sections. The contract for Phase 2 was awarded in 2007 and construction was anticipated to be completed in 2010;
- **Phase 3:** A Design and Build contract comprising the widening of 1.3 km length of motorway south of the N3 Junction to north of the Toll Plaza, and the removal of the Toll Plaza. The contract was awarded in 2007 and construction was expected to be completed by 2008.

Table 1.1: Overview of M50 Upgrade Scheme

Contract	Section	Details
Contract 1	M50 Junction 7 – 10	8km mainline 3 junctions
Contract 2	M50 Junction 3 – 6 & Junction 10 – 14	24km mainline 7 junctions
Contract 3	M50 Junction 6 – 7 Removal of Toll Plaza and mainline works	2km mainline 500m mainline
O&M	M50 Junction 3 – 17	39km mainline

Source: National Roads Authority

1.2. Department of Finance Guidelines for Post-Project Reviews

The Department of Finance (DOF) Guidelines¹ indicate that it is the responsibility of the project Sponsoring Agency to carry out post project reviews. These should be carried out for all projects costing in excess of €30 million. Post project reviews should also be carried out on a representative sample of all projects generally. The sample should cover at least 5 % of completed projects.

The Department indicates that there should be two separate focuses of post-project review namely:

- project outturn; and
- appraisal and management procedures.

With regard to the review of project outturn, the Department indicated that the aim here is to determine whether:

- The basis on which a project was undertaken proved correct;
- The expected benefits and outcomes materialised;
- The planned outcomes were the appropriate responses to actual public needs;
- The appraisal and management procedures adopted were satisfactory;
- Conclusions can be drawn applicable to other projects, to the ongoing use of the asset, or to associated policies.

1.3. The Methodology Used

The overall approach to the post project review used in this report was to identify the relevant stages in the scheme and to establish the key questions that would address the requirements of the DOF guidelines. The relevant stages are:

1. Scheme conception
2. Scheme planning
3. Scheme implementation
4. Scheme operational performance

The following aspects of each stage were evaluated in the review:

Scheme Conception

- The history of the scheme
- The establishment of need
- The objectives set for the scheme

Scheme Planning

- Quality of traffic analysis and forecasting
- Quality of route selection process and preliminary design processes
- Quality of project appraisal processes
- Compliance with procurement, EIS and other statutory requirements
- Adequacy of consultation processes

Scheme Implementation

- Scheme management structures in line with DOF guidelines
- Quality of monitoring reports

¹ Guidelines for the Appraisal and Management of Capital Expenditure Proposals in the Public Sector. Department of Finance, February 2005, as amended by the Value for Money Circular of January 2006.

- Scheme budget compliance
- Scheme schedule compliance
- Quality of scheme scope, value and risk management

Scheme Operational Performance

- Extent of achievement of Scheme objectives
- Predicted versus actual traffic volumes
- Implications for validity of ex-ante appraisal
- Traffic operation and road safety outcomes

1.4. Layout of the Report

This report addresses each of the four review elements in turn, beginning with a discussion of the scheme conception. A summary of the findings is then presented.

2. Scheme Conception

2.1. Background

History of M50

The need for an M50 by-pass of Dublin city to alleviate traffic congestion in the city centre was identified as early as the 1970s. Plans for the route were formalised in the Dublin Transportation Study (DTS) in 1971, where the need for a complete ring motorway around Dublin, linking the national and regional radial routes before they entered the city, was identified. The M50 followed this proposed alignment to the west of the city, with the Dublin Port Tunnel and the proposed Eastern Bypass completing the orbital route.

In 1990 the first section of the motorway was opened. By the time the last segment was opened in 2005, the M50 in its entirety was connecting traffic from the M1 Motorway to the M11 Motorway at Shankill, and facilitating traffic movements between the principal national primary (N2, N3, N4 and N7), secondary (N81) and regional (R108 and R110) routes radiating from the city.

While the original purpose of the M50 was primarily to connect the radial routes and allow long distance travellers negotiate Dublin City without having to use the city street network, in reality, the M50 was functioning not only as a regional bypass but also as an urban collector/distributor between communities, employment and shopping centres. The increase in car ownership and changes in land use and travel patterns over the late 1990s and 2000s resulted in congestion on many parts of the Dublin road network. The M50 in particular experienced compound traffic growth rates of between 8 and 10 per cent on most sections between the period 1998 and 2004. This level of traffic growth had not been envisaged at the time of the original development of the M50.

Table 2.1: M50 Traffic Growth 1997 – 2003

M50 Mainline Section	% Growth per Annum (AADT)
M1 - Ballymun	8.6
Ballymun – N2	9.1
N2 – N3	8.5
N3 – N4	8.4
N4 – N7	9.0
Ballymount – N81	9.7

Source: EIS M50 Upgrade Scheme

History of the Toll Plaza

A 3.2km section of the M50 comprises two side by side bridges spanning the River Liffey between Junction 6 and Junction 7. In 1987, Dublin City Council entered into an Agreement with a private company, West-Link Toll Bridge Ltd, a wholly owned subsidiary of NTR, under which NTR agreed to construct the 3.2km toll road, including the bridge crossing. In return, the company were granted tolling rights to the road for a period of 30 years after which the road was then to revert to the State. The West-Link Toll Road opened to traffic in March 1990. A provision within the Toll Agreement provided that NTR would pay a proportion of collected toll revenues (Gross Toll Revenue - GTR) to the State when the average daily traffic volumes passing the toll bridge exceeded an agreed threshold, namely 27,000 vehicles. The toll share proportion, referred to as the 'licence fee', commenced at 30 per cent of the GTR for the first 8,000 vehicles in excess of the 27,000, and rose in accordance with increases in traffic volumes measured at agreed intervals.

In June 2001, and having regard to bridge capacity constraints a revised Agreement was entered into with West-Link Toll Bridge Ltd under which the company undertook to construct a second parallel bridge in return for a revised toll scheme which saw the car toll rate increase to recompense the

second bridge costs. The revised toll scheme also added a fourth band to the licence fee structure under which the State would receive 80 per cent of GTR for traffic volumes in excess of agreed thresholds in respect of relevant years. The fourth band commenced at 96,000 in 2006 and increased in annual tranches to 106,000 from 2009. The second West-Link Toll Bridge opened in 2003. Under the Agreements with the State, NTR had exclusive rights to operate and toll the bridged section of the M50 until 2020 and NTR would make annual payments of the State's share of the toll revenue in April each year.

M50 Upgrade Scheme Overview

Continual strong traffic growth in the early 2000s resulted in traffic volumes using the M50 exceeding those forecast at the time of the motorway's construction and as a consequence daily users were experiencing congestion and time delays at certain times across many sections of the M50. This was documented as part of the M50 Upgrade Scheme EIS. The identified M50 motorway deficiencies at peak times were:

- Inadequate road lane capacity on the motorway;
- Inadequate capacity at the junctions; and
- Inadequate capacity at the West-Link toll plaza.

To address these deficiencies, the M50 Upgrade Scheme was developed. The Upgrade Scheme provided for: the widening of 34 kms of existing M50 motorway to three lanes, with an additional fourth auxiliary lane in each direction between the M1 Interchange and Scholarstown Interchange; the upgrading of 10 junctions / interchanges; and the upgrading of the West-Link toll plaza to a fully barrier free electronic toll facility.

In considering the M50 Upgrade requirements the NRA, with the agreement of Government, took the decision to buy out the NTR West-Link contract and to run a tender competition to appoint an entity to design, build and operate the new barrier-free tolling system. Following this competition, the NRA, in March 2007, appointed BetEire Flow to design, build and operate the electronic tolling system. Under the new arrangements from August 2008 all toll revenues collected from the new tolling scheme would go to the NRA, with the toll operator paid a service fee for operating and maintaining the system. In order to buy out the rights and entitlements of NTR under the West-Link Concession Agreement, the State agreed to pay €50 million per annum, indexed in line with movements in the CPI, over the period August 2008 – March 2020 along with payment of a VAT liability of the order of €140 million. It was envisaged that the toll revenues collected from August 2008 onwards would contribute to the funding of

- The upgrading of the M50 motorway works;
- The operation and maintenance of the M50;
- The costs relating to the termination of the NTR's West-Link concession agreement; and
- The services contract for the design, implementation and operation of barrier free electronic tolling.

2.2. Need and Objectives

Need for M50 Upgrade Scheme

Traffic surveys were undertaken on the M50 and its junctions to identify the location and scale of traffic congestion. The DTO Transportation Model was used to quantify the scale of future traffic volumes on the M50 and its junctions in the forecast years 2008 (year of opening) and 2023 (design year) if nothing was done (Do-Min). Operational criteria for the M50 mainline and junctions were established as a means of quantifying the likely scale of traffic problems that would occur on the existing M50 in the scenario where no upgrade took place.

In relation to the mainline, the Congestion Reference Flows (CRF) were forecast, where the CRF of a link refers to the AADT at which the carriageway is likely to be congested in the peak periods on an

average day (where congestion is defined as the situation where the hourly traffic demand exceeds the maximum sustainable hourly throughput of the link). As set out in the Table 2.2, it was found that in the Do-Min scenario many sections of the M50 would be operating around or above capacity by 2008 (90 per cent was the threshold).

Table 2.2: Forecast Traffic in Do-Min as % of Congestion Reference Flows on M50

M50 Sections	CRF (pcus)	Do Min 2008 % of CRF	Do Min 2023 % of CRF
M1 - Ballymun	124,600	71	61
Ballymun – N2	124,600	91	85
N2 – N3	124,600	100	96
N3 – N4	124,600	111	106
N4 – N7	124,600	108	107
N7 – Ballymount	124,600	105	105
Ballymount – N81	124,600	97	99
N81 – Scholarstown	124,600	94	99
Scholarstown – Ballinteer	124,600	99	105
Ballinteer – Sandyford	124,600	90	92
Sandyford – Carrickmines	124,600	72	105
Carrickmines - Loughlinstown	124,600	68	103
Loughlinstown – M11	124,600	52	82

Source: EIS M50 Upgrade Scheme

In relation to the junctions, the following operational criteria were used:

- The maximum degree of saturation of any link should not ideally exceed its practical capacity taken as 90 per cent of its theoretical capacity;
- The maximum ratio of flow of any normal approach to a roundabout should not desirably exceed 85 per cent of its theoretical capacity; and
- Any queues on the M50 off-slip lanes should not extend back to block through lanes on the M50.

The forecast traffic conditions at the M50 Junctions in the Do-Min scenario were forecast using peak hour traffic forecasts. The analysis identified that the traffic demand at many of the existing junctions would significantly exceed capacity, with implications on journey times.

The EIS prepared for the Upgrade Scheme identified the West-Link toll facility as a contributing factor to the delays experienced by road users on the M50. The West-Link toll plaza at the time had 14 toll lanes, 7 per direction, with little scope for providing additional toll lanes at the existing plaza locations. In addition the geometry of the exit and entry taper area of the plaza had a significant impact on congestion. The two lane bridge to the South was too close to the toll plaza and to the North the two lane motorway splayed out to the tolls booths over a very short distance with considerable queuing back along this section. Having regard to the then existing traffic volumes and forecast traffic growth on the M50, it was recognised in the EIS that the West-Link plaza was sub-optimal in size and geometry.

Objectives of M50 Upgrade Scheme

It is explicitly outlined in the Environmental Impact Statement (EIS) prepared for the Upgrade Scheme that the objectives of the Upgrade Scheme were aligned with those of the Government, as set out in government policy documents including the National Development Plan; the Dublin Transportation

Office's A Platform for Change Strategy 2006 – 2016; and in Dún Laoghaire-Rathdown County; South Dublin County; Fingal County; and Dublin City Development Plans. The actual proposal to upgrade the M50 (the M50 Upgrade Scheme) was put forward by Dún Laoghaire-Rathdown County Council on behalf of Dún Laoghaire-Rathdown County, South Dublin County, Fingal County and Dublin City Council.

The objectives of the Upgrade Scheme, as set out in the EIS, were:

- improve access on and off the motorway;
- to increase the capacity of the motorway mainline;
- to reduce traffic congestion both on the M50 and local roads;

The transport assessment concluded that the Scheme would meet its objective of increasing the capacity of the M50 and would provide significant benefits including:

- reducing traffic congestion and delays for private vehicles and public transport services on and around the M50. The Scheme was predicted to increase average travel speeds on the motorway during the morning peak hours in 2008 by 19 per cent (10kmph) and in 2023 by 11 per cent (6kmph), compared to a situation where the Scheme was not built;
- reducing traffic congestion and delays for all road users on the wider Dublin road network. Average road speeds on the wider Dublin network were predicted to increase by 9 per cent in the morning peak, and 12 per cent in the off-peak periods in 2008 compared to a situation where the Scheme is not built;
- improved accessibility to Dublin airport and Dublin Port; and
- traffic reductions on a number of local roads in and around the M50 corridor.

3. Scheme Planning

3.1. Traffic Analysis and Forecasting

The traffic analysis prepared for the M50 Upgrade Scheme was underpinned by traffic surveys undertaken on the M50 and its junctions, to identify the location and scale of traffic congestion.

The base year for the traffic analysis was 2004. The year of opening was assumed to be 2008 and the design year 2023.

The DTO Transportation Model was used to quantify the forecast scale of future traffic volumes on the M50 and its junctions in the forecast years 2008 (year of opening) and 2023 (design year) if the Upgrade Scheme was not implemented (Do-Min). The model was completed by consulting engineers who were employed by Dun Laoghaire Rathdown County Council (the lead local authority for the Project). The Do-Min Scenario encapsulated all elements of the then existing Dublin transportation network as well as the transport infrastructure commitments of the DTO Strategy (with exception of the Upgrade Scheme). The Do-Something Scenario for each of the design years 2008 and 2023 was based on the widening of the M50 to dual 3-lane motorway between the M1 and Sandyford together with auxiliary lanes between the M1 and Scholarstown and associated interchange/junction upgrades. The public transport and other infrastructure proposals contained in the DTO Strategy which were anticipated to be completed and operational by each year were also included in the Do-Something Scenario.

The DTO Saturn traffic model was used to produce baseline and forecast traffic flows. The model was updated by the DTO in 2003, with a 2001 AM peak hour. This model was independently audited and reported on to the DTO in June 2003. The audit concluded that the quality and performance of the model components was in line with expectations and that the highway assignment model had a solid state performance. The report continued to note that the ability to forecast GDP growth rates was inherently limited and recommended GDP sensitivity analysis to be carried out. In addition to the model, output growth factors were applied to the existing levels of traffic on the M50 as a sense check; rates of 3%, 6% and 10% were used. At this time the historic data had indicated that average growth on the M50 was 6%. Sensitivity analysis was also carried out on the CRF calculations. The modelling process undertaken which included the use of external experts and independent auditors were considered to be in line with best practice of the time. Growth rate assumptions of 3%-10% used by the consultants as part of their analysis in 2003 were indicative of the growth in the economy at the time of the study. The economic reality of the last five years has resulted in lower than expected growth and lower traffic levels. Notwithstanding the lower traffic outturn the M50 continues to be the main artery of the capital and is the busiest road on the entire network, with observed growth in daily traffic volumes of 25% on some sections and AM peak increases of 40% on some sections of the M50 between 2010 and 2013²

3.2. Route Selection and Preliminary Design

Route Selection

During the Scheme development process, alternative major road schemes were investigated, including:

- the provision of a new orbital route;
- the provision of a new connection to the M50 between the existing N4 and N7 junctions via a possible M7;

² M50 Demand Management Study (April 2014)

- the provision of a new link road between the N2 and N3 as a possible measure to reduce traffic congestion at the N3 interchange and minimise the need for improvements at this interchange;

In addition to major highway options, a range of other alternative measures were examined including:

- The use of the third lane as a dedicated orbital facility for buses and taxis;
- A number of low cost traffic management measures, including partial use of the hard shoulder at specific locations and the extension of some merging lanes, to alleviate problems at specific locations on the M50;
- Minor M50 interchange improvements such as improved signalisation, further segregated left turn lanes, traffic management and bridge widening to provide additional lane capacity, in conjunction with the provision of a third lane in both directions.

These measures were documented and reported on through a series of Technical Papers and Interim Reports, including the “Review of the M50 Upgrade” report, issued by the consultants in May 2003. However, it was concluded that none of these options would realistically provide a long term solution that would offer the same benefits, and alleviate the need for upgrading the M50. Other short term alternatives considered was a study to see if the existing signal timings on the junctions could be improved. This Study was undertaken in conjunction with Dublin City Council and their SCATS consultant, but the benefits were found to be marginal.

Design of Upgrade Scheme

An incremental approach was taken to the design of each component of the M50 Upgrade Scheme. The approach involved examining at first minor upgrades, and then increasing in increments until one or more schemes met the design criteria of improving capacity, whilst taking account of site constraints.

The Scheme’s design development occurred over the 2000 – 2004 period. The Scheme development was put on hold mid-way through this period pending funding approval. A preliminary upgrade scheme for the M50 was developed between 2000 and 2002 using the DTO Traffic Model with forecast design years of 2006 and 2016. The Scheme proposals were progressed between 2003 and 2004 and a number of the interchange layouts were reconsidered. The proposed Scheme was subsequently tested using a newer DTO traffic model with forecast traffic design years of 2008 and 2023. The new DTO model assumed that the proposals in the DTO A Platform for Change Strategy were delivered for 2016³.

The decision to widen the mainline was based on an assessment of future traffic flows if the Scheme was not implemented. These flows were tested against predetermined performance criteria. The performance criteria were used to assess the need for widening each section. On the basis of the traffic forecasts and the performance criteria it was found that the sections of the M50 where widening to three lanes were justified were those between Ballymun and Sandyford. To ensure the strategic integrity of the M50 widening project, it was not considered appropriate to exclude the section between the M1 and Ballymun.

A review of all bridges over and under the M50 was undertaken to establish any constraints in terms of width and clearance available for mainline widening. The main constraint identified during the review was the arched bridges at the N3, which had sufficient width to accommodate only three

³ The proposals included the completion of the Eastern Bypass. Owing to the fact that the completion of the Eastern Bypass was included in both the Do-Min and Do-Something scenarios, the benefits attributable to the Upgrade Scheme as part of the traffic analysis may have been under-estimated in the modelling, as the Eastern Bypass if constructed would alleviate traffic conditions on sections of the M50 north of Sandyford in the Do-Min, and consequently lowered the benefits associated with the upgrade as part of the Do-Something.

carriageway lanes and a sub standard hard shoulder. Other constraints identified included existing drainage, utilities, noise and lighting.

The forecast increase in traffic flows and associated weaving movements generated a need to extend the length of merge and diverge tapers at the junctions. Given the close proximity of the M50 junctions and to facilitate safe weaving it was decided that the slip lanes should be extended to form auxiliary lanes between each interchange from the M1 to Scholarstown. As it stood, there had been auxiliary lanes between the N7 and Ballymount and between the N81 and Scholarstown.

A qualitative and quantitative assessment of the levels of traffic congestion at the junctions on the M50 was also undertaken. It was determined that significant traffic growth was taking place on main radial routes feeding into M50 owing in part to upgrade works on these radial routes. The forecast traffic conditions at the M50 junctions in 2023 in the Do-Min scenario were assessed using the peak hour traffic forecasts from the traffic model and identified the need to upgrade almost all junctions. An incremental approach was taken to the development of the interchange upgrade options. The design process was based on future traffic movements and an understanding of the physical and environmental constraints. The process involved examining minor upgrades in the first instance, then increasing in scale of improvement until one or more schemes met the design criteria⁴. In addition to the consideration of the individual upgrade proposals for each interchange, the interaction of the various interchange upgrades on each other was also considered in the transportation analysis.

In conjunction with the traffic analyses of the junctions, engineering designs of the options were undertaken to confirm their feasibility. The process identified at least one option at each of the interchange locations which met the traffic assessment criteria and which were feasible with respect to design. The feasibility of all options were considered and compared in the context of:

- Environmental effects
- Land take
- Integration with public transport
- Buildability
- Construction disturbance
- Cost

3.3. Project Appraisal

M50 Upgrade Scheme Economic Appraisal

A Cost Benefit Analysis was undertaken to assess the economic worth of the M50 Upgrade Scheme (Do-Something) when compared to the Do-Min. The economic assessment was completed on a spreadsheet model with input coming from the DTO model. The benefits incorporated include the:

- Travel time savings (as a result of reduced congestion)
- Changes in vehicle operating costs
- Changes in accidents

The costs incorporated included the:

- Initial capital costs (ex VAT)
- Ongoing maintenance costs (ex VAT)

⁴ The initial minor upgrades identified possible improvements such as the revision of lane markings, the introduction of traffic signals or further segregated left turn lanes. If these did not achieve the design criteria objectives then more substantial measures were considered including bridge widening and the case of the N2, N3, N4 and N7 Junctions, the possible construction of radial flyovers across the junctions.

An evaluation period of 35 years was adopted. Costs and benefits were discounted over that period to a base year 2004 using a 5 % discount rate.

The combined monetary benefit of time savings, vehicle operating costs and accident savings amounted to a present value of benefits of €4,919 million. Allowing for the capital and maintenance costs totalling €807 million, this resulted in a Net Present Value of €4,142 million, a benefit cost ratio of 6.33, and an IRR of 35.3 %.

Sensitivity tests using 8 per cent and 10 per cent discount rates were undertaken. No sensitivity analysis to traffic forecasts or construction costs was undertaken.

On the basis of the traffic forecasts as set out in the Scheme's EIS, the traffic analysis underpinning the calculation of user benefits appears to have over-estimated the traffic volumes that would use the M50, and as such there will have been a corresponding over-estimation of the travel time benefits associated with the Scheme as part of the Cost Benefit analysis. This is explored further in Section 5.2. In addition, the cost estimate of the Scheme Upgrade (€807m) as input to the Cost Benefit Analysis, excluded the eflow costs and benefits associated with gantries, roadside equipment, and back office development, which normally would have been included in the costs associated with the Scheme. These were not included in the EIS as the precise arrangements for the West-Link Tolling remained to be determined.

Table 3.1: Overview of Cost Benefit Analysis Results

Discount Rate	5%	8%	10%
NPV	4,142	2,592	1,941
Benefit Cost Ratio	6.33	4.62	3.84

Source: EIS M50 Upgrade Scheme

Exchequer Impacts associated with the Upgrade Scheme

The significant payments to NTR to buy out their rights to the West-Link bridge are an unusual feature of the M50 Upgrade Scheme project. The NRA was required to make such payments to NTR to acquire their rights over the West-Link bridge in order to introduce barrier free tolling. In return for this payment the State/NRA would receive all of the toll revenue from the West-Link, rather than a share of the toll revenue as provided under in the annual license fee from NTR.

The buy-out payments to NTR and the additional toll revenue for the State were not included in the Upgrade Scheme Cost Benefit Analysis carried out by the NRA. This economic appraisal approach is correct. The payment to NTR is a transfer and does not represent a net cost to the economy as it does not represent a use of the economy's resources. It is, rather, a reduction in producer surplus for the State offset by an increase in producer surplus for NTR. In the same way the increase in future toll revenue for the State is a transfer rather than a benefit. It represents a loss of producer surplus for NTR offset by a gain in producer surplus for the State. The Cost Benefit Analysis discussed above therefore broadly includes all of the relevant costs and benefits of this project.

The buy-out payments to NTR do however represent a significant financial impact to the Exchequer which is relevant to the financial appraisal of this project.

The financial impact is considered the difference between the revenues that would be due to the Exchequer in the absence of the scheme and the revenues due to the Exchequer when the scheme is in place.

In the twelve months preceding the buy-out, licence income of approximately €22 million was received by the State from NTR. In 2013, the net benefit of barrier free tolling to the State of tolling operations for the year was €14 million (see Table 3.2). Therefore an annual cost of circa €8 million to the Exchequer is forecast. This applies up to 2020 which is the end of the buy-out period. In addition, there were initial construction and set-up costs applicable to the first year.

Table 3.2: 2013 Financial impact of Barrier Free Tolling

	€'m
Total revenue	96.4
Costs:	
Toll Operations	(20.4)
Enforcement	(2.5)
Other	(8.2)
Total Operating Costs	(31.1)
Net revenue from barrier free tolling	65.3
Less: Application of M50 buyout (payment to NTR)	(51.4)
Estimated net benefit of barrier free tolling operations in 2013	13.9

Source NRA

Over the period of the buy-out, the net financial cost to the Exchequer associated with barrier free tolling is forecast to total circa €75 million (NPV 2002 prices).

This is a small fraction of the forecast net economic benefits (NPV €4,124 million) of the project made possible by this Exchequer transaction.

The Exchequer impact of this financial transaction with NTR is necessary to realise the significant economic benefits of the full scheme.

3.4. Compliance with Procurement, EIS and other Statutory Requirements

3.4.1. Procurement Process

Three separate procurement processes were conducted, as follows:

- Contract 1 was procured as a Design and Build Contract;
- Contract 2 was procured via a Public Private Partnership arrangement; and
- A contract for the design, implementation and operation of barrier free electronic tolling was procured as a services contract.

In each case, the procurements were conducted in an open and transparent manner, and in line with the relevant EU and national regulations.

Table 3.3: Overview of Procurement Processes

	Contract 1 D&B	Contract 2 PPP	Contract 3 Free-Flow	Contract 3 D&B (N3 – N4)
Type of award procedure chosen	Restricted	Restricted	Restricted	Restricted
Date of Prior Information Notice	6-May-2004 (Contract Notice)	13-Feb-2006	2-Mar-2006	4-Jul-2006
Contract Notice		20-Feb-2006	4-Mar-2006	8-Aug-2006
No. requests to participate received	5	6	14	3
No. candidates shortlisted	4	5	7	3
Closing date for receipt of Tenders		9-Feb-2007	4-Dec-2006	16-Feb-2007
No. tenders received	4	5	5	3
Basis of chosen tender	The most economically advantageous tender received. (50% Price, 50% Technical Submission)	Submission completed the PPT requirements.	The most economically advantageous tender received.	Suitable to execute a contract of scale and complexity and submitted the lowest tender.

Contract 1

A Contract Notice of the Scheme was dispatched to the Office for Official Publications of the European Union and included in the Official Journal of the European Union (OJEU) on the 6th May 2004. The award procedure chosen was a restricted procedure requiring the pre-qualification of candidates to tender. Five requests to participate were received from interested candidates. Four candidates were short-listed and invited to tender. Tenders were received from all four tenders by the required deadline. The suitability of tenderers was assessed in terms of the requirements of the contract. The successful tenderer was chosen based on the most economically advantageous candidate.

Contract 2

A Prior Information Notice of the Scheme was dispatched to the Office for Official Publications of the European Union and included in the Official Journal of the European Union (OJEU) on 13th February 2006 seeking Request to Participate submissions from interested candidates. The award procedure chosen was a restricted procedure requiring the pre-qualification of candidates to tender. Six requests to participate were received from candidates by the closing date 27th April 2006, which were assessed in terms of their 'financial and economic standing and eligibility' as well as their 'ability and technical capacity'. Five candidates were short-listed and invited to tender. Tenders were received from all five tenderers by the required deadline in February 2007. The suitability of tenderers was assessed in terms of the requirements of the contract.

Contract 3 (Free-Flow)

A Prior Information Notice of the Scheme was dispatched to the Office for Official Publications of the European Union and included in the Official Journal of the European Union (OJEU) on 2nd March 2006 seeking Request to Participate submissions from interested candidates. The award procedure chosen was a restricted procedure requiring the pre-qualification of candidates to tender. Fourteen requests to participate were received from interested candidates. Seven contractors were selected by the evaluation board to be invited to submit tenders for the contract. Tender documents were issued

to the seven contractors. Five contractors returned completed tenders by the closing date for receipt of tenders (the closing date was updated several times in order to address issues raised in the course of the query procedures, the final closing date was the 4th December 2006). The successful tenderer was chosen based on the most economically advantageous candidate meeting the project criteria.

Contract 3 (D&B (N3 – N4))

A Prior Information Notice of the Scheme was dispatched to the Office for Official Publications of the European Union and included in the Official Journal of the European Union (OJEU) on 4th July 2006 seeking Request to Participate submissions from interested candidates. The award procedure chosen was a restricted procedure requiring the pre-qualification of candidates to tender. Three requests to participate were received from candidates by the closing date for receipt of submissions. All three candidates were short-listed and invited to tender. Tenders were received from the three tenderers by the required deadline. The suitability of tenderers was assessed in terms of the requirements of the contract. The successful tenderer was chosen based on the being the most suitable candidate to execute a contract of the appropriate scale and complexity, and the lowest submitted tender.

3.4.2. Environmental Impact Statement

A full Environmental Impact Statement (EIS) was prepared and submitted to on Bord Pleanála. The EIS structure and assessment method followed the EPA guidelines. The EIS was prepared by ARUP Consulting Engineers for Dún Laoghaire-Rathdown County Council on behalf of Dún Laoghaire-Rathdown County, South Dublin County, Fingal County and Dublin City Councils. EIA Scoping was undertaken to determine the nature and detail of information to be contained in the EIS.

3.4.3. Statutory Requirements

The power of the NRA to make a toll scheme is laid down in legislation and this legislation stipulates that specific procedures are followed. In a report prepared as a result of the oral hearing heard in relation to the NRA's draft Toll Scheme prepared for the barrier free tolling, it was found that the NRA demonstrated compliance with the required procedures.

3.5. Adequacy of Consultation Processes

Extensive consultation with the public was undertaken during the preliminary design development and the EIS preparation phase of the Upgrade Scheme project. The issues and concerns identified during this period were incorporated into the design of the scheme and addressed in the EIS. The first public consultation sessions were held in July and August 2001. The Scheme was presented and explained to the community through use of design drawings, photographs, artistic impression sketches, physical models and videos. Members of the design and EIS team and representatives from the Local Authorities were available at specified sessions to provide further detailed information.

Questionnaires and pre-paid reply envelopes were distributed at the consultation sessions to enable individuals to easily make a written submission on the proposed scheme and the issues to be addressed in the EIS. Over 400 written submissions were received after the consultation. The concerns raised were addressed where possible as part of the design development and the environmental impact assessment process. The public comments resulted in changes to the design of several aspects of the scheme.

Following publication of the Scheme and the EIS, six public information sessions, advertised in the national press, were held where staff familiar with the Scheme and the EIS were on hand to clarify the contents of both.

Under Section 57 of the Roads Act 1993, as amended by section 271 of the Planning and Development Act 2000 and Section 3 of the Roads Act 2007, an Explanatory Statement accompanying the Draft Toll Scheme outlining the provisions of the Scheme, and its purpose and effect must be provided. In accordance with Section 57, the Authority sent a copy of the Draft Toll Scheme to SDCC and Fingal CC and gave notice that:

- The Authority had prepared a Draft Toll Scheme; and

- Written representations in relation to the Draft Toll Scheme could be made to the County Councils to the Authority.

In accordance with the Section 58 of the same Act, the Draft Toll Scheme and its Explanatory Statement were made available for public inspection from September to October 2007 at the NRA offices. Copies were also available free of charge upon request from the Authority and could be downloaded from the Authority website. Public notification of the making of the Draft Toll Scheme and arrangements for its inspection and opportunities for making objections were advertised in the national press. A total of six objections were submitted in writing to the Authority. An Oral Hearing was organised and held in November 2007.

4. Scheme Implementation

4.1. Scheme Management Structures

By the time the Scheme reached preliminary design stage, the NRA's National Road Project Management Guidelines (2000) were in place. These Guidelines incorporated good practice in scheme management. NRA procedures ensured that the Scheme was generally managed in line with these Guidelines.

In relation to the PPP Contract, the PPP section within the NRA reported to a PPP Committee who in turn reported to NRA Board.

4.2. Quality of Monitoring Reports

Scheme monitoring reports are a vital input to scheme management. Sample monitoring reports were examined and indicated that an acceptable scheme monitoring process was followed.

4.3. Quality of Scope, Value and Risk Management

A formalised risk assessment and management process was not in place for this project. However, the process of managing project risk throughout the development and implementation of the project is inherent in the structures and approach adopted throughout the project cycle.

- Establishment of a Steering Committee for the project. That Committee meets on a regular basis, reviews key issues on the scheme and decides on key aspects of the project following consideration and analysis of the issues concerned. Integral to that is a qualitative approach to risk management;
- Review and approval processes adopted by NRA. The Project Management Guidelines in operation since 2000 have built up 'hold points' where approval from the NRA is required before the project can proceed. Part of this approval process involves the NRA reviewing and assessing the project in its totality with the risks and issues associated with the project becoming a part of that consideration.
- A rigorous process is in place for the development of the contract requirements for the construction phase. This is a key point in the process where risk is determined to lie with either the Employer or the Contractor. The NRA centrally reviews and updates its forms of contract to take on board lessons learned on other projects and the benefit of that experience is brought to bear on the relevant project. Equally, the final tender documents are required to be approved by the NRA prior to tender issue.
- During the construction stage the process of risk management during the contract distils in many ways to optimally managing the construction contract. This is achieved through having dedicated site teams reporting to a steering committee. Reporting arrangements include monthly reports which track project cost, variation cost, claim situations, progress and similar. The NRA itself is also an integrated part of this process with a Senior Project Manager assigned responsibility to monitor and assist the optimal delivery of the scheme.
- In addition to other support services, the NRA also has in place a Cost Management Unit which since 2000 also assists local authorities in cost estimation and claim cost management.
- The NRA utilises its own procurement and claims management experience to assist in dealing with contractual issues and disputes. Part of that assistance can and does include the services of the NRA's legal advisors.

4.4. Scheme Schedule

Table 4.1 sets out the start, scheduled completion and actual completion dates for each element of the overall Upgrade Scheme.

Broadly speaking the Upgrade Scheme was completed in line with the scheduled timeframes. There were just a couple of minor delays. Contract 1 for example was completed three months behind schedule, while there was a two-month delay to part of the mainline work forming Contract 3.

Table 4.1: Overview Upgrade Scheme Scheduled Dates

	Section	Start Date	Scheduled Completion Date	Actual Completion Date
Contract 1	M50 Junctions 7-10	Mar 2006	Dec 2008	Mar 2009
Contract 2	M50 Junctions 3-6 & 10-14	Dec 2007	Oct 2010	Oct 2010
Contract 3	M50 Junctions 6-7	Jun 2007	Apr 2008	Jun 2008
	Toll Plaza removal & mainline works	Aug 2008	Apr 2009	Apr 2009

Source: National Roads Authority

4.5. Scheme Budget Costs

Overall the M50 Upgrade Scheme came in under budget. See Table 4.2.

Table 4.2: Overview Upgrade Scheme Costs (Nominal Values including VAT)

	Estimate at Tender Award (as input into CBA)	Outturn
Total (All Contracts - €m)	931.98	836.75

Source: National Roads Authority

The costs in Table 4.2 exclude the costs associated with tolling gantries, roadside equipment and back office development. These costs add an additional circa €15m to the outturn cost associated with the Upgrade Scheme.

5. Scheme Operational Performance

5.1. Achievement of Objectives

The objectives associated with the M50 Upgrade Scheme include improving access onto and off the motorway; increasing capacity on the motorway; and reducing congestion levels.

On the basis of the works that were completed in terms of adding an additional lane to the motorway between the M2 and the Sandyford Junctions in each direction, and upgrading the junctions along its route, the first two objectives have been successfully achieved.

The extent to which the Upgrade Scheme has contributed to the reduction of the congestion delays has been impacted both by the increased capacity resulting from additional lanes, as well as the overall reductions in traffic volumes owing to the significant recession which has materialised since 2008.

5.2. Predicted versus Actual Traffic Volumes

As part of the traffic modelling prepared for the Upgrade Scheme it was estimated that the traffic volumes (AADT values represented in pcus)⁵ along the M50 would have reached the levels set out in Table 5.1.

Table 5.1: Forecast Traffic Flows on M50 in Do-Min and Do-Something Scenarios (AADT pcus)

M50 Sections	Do-Min		Do-Something	
	2008 (pcus)	2023 (pcus)	2008 (pcus)	2023 (pcus)
M1 - Ballymun	88,000	76,600	152,400	152,900
Ballymun – N2	113,400	106,100	192,900	191,100
N2 – N3	124,900	119,600	210,500	210,000
N3 – N4	137,800	132,000	216,800	213,500
N4 – N7	134,300	133,300	202,400	214,600
N7 – Ballymount	130,300	130,600	190,100	202,900
Ballymount – N81	120,500	122,800	166,100	189,000
N81 – Scholarstown	117,000	123,900	150,000	172,400
Scholarstown – Ballinteer	123,600	130,600	145,900	166,200
Ballinteer – Sandyford	112,400	114,900	99,000	120,200
Sandyford – Carrickmines	89,500	130,800	97,900	132,900
Carrickmines - Loughlinstown	84,800	127,800	87,900	134,800
Loughlinstown – M11	64,300	102,100	66,100	121,900

Source: EIS M50 Upgrade Scheme

Tables 5.2 and 5.3 compare the forecast traffic volumes with actual traffic volumes.

While the predicted traffic volumes look high, it must be recognised that these flows are based on Congestion Reference Flows (CRF), and not the standard Level of Service objectives which would commonly apply to rural road improvement schemes. The CRF allows “congestion” to occur, and in

⁵ AADT refers to average annual daily traffic flows; pcus are passenger car units, where a car is represented by 1 pcu, and a heavy goods vehicle/bus is represented by 3 pcus.

the study was defined as the situation when the hourly traffic demand exceeded the maximum hourly throughput of the road link.

Table 5.2 compares actual traffic volumes between the N3 and the N4 as measured by 2007 October traffic counts, with those forecast in the Do-Min for 2008. As set out in the Table, actual traffic volumes were 21 per cent below those forecast in the Do-Min.

Table 5.2: Comparison of Predicted Do-Min and Actual Traffic Volumes, 2008

Location	2008 Predicted pcus	2007 Actual pcus	Divergence (%)
M50 N3-N4	137,800	107,980	-21.6%

Sources: EIS M50 Upgrade Scheme and NRA

In the case of the Do-Something forecasts, on the basis of interpolation, the 2013 forecast traffic volumes are set out in Table 5.3, together with estimates of actual traffic volumes that have materialised. Again, we can see that actual traffic volumes are falling significantly short of the forecast volumes.

Table 5.3: Comparison of Predicted Do-Something and Actual Traffic Volumes, 2013

Location	Predicted pcus	Actual pcus	Divergence (%)
Ballymun – N2	192,566	125,600	-35%
N2 – N3	210,333	139,600	-34%
N3 – N4	215,694	130,100	-40%
N4 – N7	206,388	134,000	-35%
N7 – Ballymount	194,274	128,700	-34%
Ballymount – N81	173,407	113,700	-34%
N81 – Scholarstown	157,123	105,600	-33%
Scholarstown – Ballinteer	152,375	86,500	-43%
Ballinteer – Sandyford	105,615	57,500	-46%
Sandyford – Carrickmines	108,400	67,400	-38%
Carrickmines - Loughlinstown	101,365	64,200	-37%
Loughlinstown – M11	81,059	47,000	-42%

Sources: EIS M50 Upgrade Scheme and NRA Traffic Counters

5.3. Implications for Ex-ante Appraisal

Obviously the shortfall in traffic volumes as set out in Section 5.2 will negatively affect the Benefit to Cost Ratio projected in the Project Appraisal.

In general traffic models have a margin of error of +/- 10%-15% in terms of their ability to forecast, and while there can be excellent correlation in the Base Year, divergence can and does occur for future forecast years. As stated earlier in this report, the DTO Model was independently audited at the time of the M50 Study. In addition the DTO model used to underpin the M50 Upgrade Scheme was extremely complex and detailed. It was a multi-modal model with large data fields and numerous assumptions involving lengthy calculations and iterations. It should also be borne in mind that the more recent traffic counts are based on a period of time during which the country has suffered the effects of a significant recession, and that the growth rates and other data assumed in the traffic analysis and EIS were in line with the economic data available at the time of the study. It is possible that the rate of increase in traffic volumes will accelerate as the country emerges out of the current recession. This has been witnessed with growth in daily traffic volumes of 25% on some sections and AM peak increases of 40% on some sections of the M50 between 2010 and 2013⁶.

⁶ M50 Demand Management Study April 2014

The M50 continues to be the busiest road on the entire network and had the largest traffic growth rate in the country between 2008 and 2013.

Furthermore, the exact accuracy of the traffic modelling and figures was not critical to demonstrate the need for the scheme, as the Do-Minimum scenario indicated that the existing M50 road did not have sufficient capacity to handle future traffic.

The benefit to cost ratio of the project as outlined in the EIS was 6:1; it can still be expected, even with a shortfall in traffic in the future beyond that predicted in the appraisal, that the economic rate of return would still be significant.

Traffic Operation and Road Safety Outcomes

A number of Stage 3 Road Safety Audits have been carried out. The Design Team responded to the issues raised in the Stage 3 Safety Audits. The Auditors accepted the Design Team's responses. No issues relating to operation of the Scheme have arisen post completion.

6. Conclusions

By the early 2000s traffic volumes using the M50 were exceeding the volumes forecast at the time of the motorway's construction and as a consequence users were experiencing congestion and time delays at certain times.

Given the strategic importance of the M50, to address this issue the M50 Upgrade Scheme was developed. The Upgrade Scheme provided for: the widening of 34 kms of the M50 motorway to three lanes, with an additional auxiliary lane in each direction between the M1 Interchange and Scholarstown Interchange; the upgrading of 10 junctions; and the upgrading of the West-Link toll plaza to a fully barrier free electronic toll facility. The NRA, with the agreement of Government, took the decision to buy out the NTR West-Link contract and to run a tender competition to appoint an entity to design, build and operate a new barrier-free tolling system at the M50 toll plaza location.

A cost benefit analysis was undertaken to assess the economic worth of the M50 Upgrade Scheme. The benefits incorporated in the economic appraisal included: time savings; changes in vehicle operating costs; and changes in accident costs. The costs incorporated included were the initial capital costs; and the ongoing maintenance costs. The combined benefits and costs resulted in a Net Present Value of €4,142 million, a benefit cost ratio of 6.33, and an IRR of 35.3 per cent.

To date traffic volumes along the M50 are well below those forecast in the traffic modelling underpinning the Upgrade Scheme project appraisal. It is too early to tell what the traffic volume outturn will be over the 35 year project appraisal period. However, as the country returns to economic growth, traffic volume growth will gain momentum, as noted in the M50 Demand Management Study. Furthermore, the benefit to cost ratio of the project was 6:1; it is still likely, even with a sizeable shortfall of traffic in the future beyond that predicted in the appraisal, that the economic rate of return would still be significant.

National Roads Authority

Post Project Review

Motorway Service Areas Tranche 1



Contract	<i>TP3 Policy and Evaluation</i>
Task Order	<i>3.1 Post Project Review Service Areas</i>
Issue Date:	<i>29th November, 2013</i>

Erratum Sheet

Post Project Review reports - Corrections

The Post Project Review reports were not originally intended for an external audience. There are in some cases errors in the reports with such errors ranging from typographical errors to in a small number of cases incorrect statements or errors in interpretation of the data (which have been identified as a consequence of subsequent reviews). We suggest that the following errata are taken into account when reviewing these reports.

Executive Summary (page 2) & (Introduction page 5)

A direction to this effect was issued by the Minister for Transport.

Should read

The NRA was requested to proceed with the delivery of service areas.

Executive Summary (page 3) & Conclusions (page 28)

c) that the exchequer's capital contribution would be recovered through revenue share payments.

Should read

c) that the exchequer's capital contribution would be recovered in part through revenue share payments.

Validity of Assumptions Underpinning Original Ex-Ante Economic Appraisal (page 15)

Fuel purchases are 19 per cent below those predicted for 2011 (see Table 6); while other retail/restaurant sales are down by some [12%] (see Table 7).

Should read

Fuel purchases are 19 per cent below those predicted for 2011 (see Table 6); while other retail/restaurant sales are down by some 10% (see Table 7).

Motorway Service Areas Tranche 1 - Post Project Review

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Executive Summary

In September 2006, the National Roads Authority (NRA) announced that it would become directly involved in the provision of on-line service areas on motorways and high quality dual carriageways. In 2009 the NRA entered into a PPP contract with the *Superstop* consortium to build three motorway service areas (MSAs) - at M1 North (near Castlebellingham); M1 South (near Lusk); and on the M4 (near Enfield) – as part of the Tranche 1 MSA Project.

This is a Post Project Review of these service areas. The background to this investment project was a high level of awareness among policy makers of the potential benefits of introducing such service areas. The Road Safety Authority, the National Roads Authority (NRA) and the European Commission have long advocated the benefits of Service Areas in terms of driver safety. In fact the Commission now intends to make the provision of online service areas mandatory for roads forming part of the TEN-T network. The NRA and the Commission also regard the provision of online services on motorways as an essential part of providing a proper level of service to road users. As a result the provision of on-line service areas on motorways was a strategic priority of the NRA and of the Department of Transport Tourism and Sport. A direction to this effect was issued by the Minister for Transport.

As with all public investment projects the decision to proceed with the Tranche 1 project in its final form was based on a detailed economic appraisal which culminated in a full business case. Typically the business cases produced by the NRA are associated with the benefits accruing from increases in the capacity and quality of roads. The expected benefits of such projects normally include journey time savings for road users and safety benefits from higher quality roads. Well established methods exist to place a money value on such benefits for inclusion in a business case. The business case for Tranche 1 broke new ground by being based on the value to road users of convenient on-line services and the safety benefits of providing such services to road users.

The current standards for Post Project Reviews are those set out in the Public Spending Code issued by the Department of Public Expenditure and Reform. This Code specifies that the aim of such a review is “to determine whether:

- The basis on which a project was undertaken proved correct;
- The expected benefits and outcomes materialised;
- The planned outcomes were the appropriate responses the actual public needs;
- The appraisal and management procedures adopted were satisfactory; and,
- Whether conclusions can be drawn which are applicable to other projects, to the ongoing use of assets, or to associated polices.”

The National Roads Authority has been carrying out exactly this type of Post Project Review of investment project for a number of years, based on its own “Project Appraisal Guidelines” and the now superseded Department of Finance Guidelines on the Appraisal of Capital Projects from 2005.

In order to answer these key questions, this post project review includes new research on the actual benefits that road users enjoyed as a result of the availability of services areas. Surveys of the users of the service areas were carried out and the results of these surveys were used to calculate a money value for the benefits coming from the availability of these service areas. Using the results of this research the post project review was able to confirm that:

- The service areas have produced significant benefits for road users and the economy as a whole. The basis for the project was one of improved driver safety and public convenience for motorists. These benefits are being borne out by the fact that a significant and growing number of road users are availing of the facilities provided. Additionally the planned TEN-T regulations will now require online service areas to be provided on the core network. Therefore the basis on which the project was undertaken has proven to be correct;
- The level of benefits and the number of road users availing of the service areas are sufficiently high that the high net benefits expected at the appraisal stage have been realised. The expected outcomes were a) that a particularly high level of service could be ensured through specific contractual requirements; b) that a significant proportion of road users would avail of the service; and c) that the exchequer's capital contribution would be recovered through revenue share payments. A high level of customer satisfaction with the quality and range of services on offer is apparent from the data collected in the MSA User Survey. Although the traffic volumes on the relevant sections of motorway are less than originally predicted (in the order of 4%), the numbers availing of the facilities has continued to increase year on year since opening. Revenue share payments to the Authority are continually above the guaranteed minimum provided for in the PPP contract and therefore the direct financial return is in line with expectations. All in all the expected level of benefits have in fact materialised;
- Although the facilities are well utilised at busy times the level of parking provision at each of the service areas is generally ahead of current need. The service area facilities were designed to a 15 year horizon, but a phased provision of the required parking need should probably have been implemented over this period. The costs have been at the level expected and the benefits have been as large as expected. Therefore the project represented the high level of value for money expected at the appraisal stage, i.e. the project has been an appropriate and proportionate response to a real public need;
- The review of processes carried out as part of this post project review confirmed that the appraisal and management procedures adopted by the NRA had been satisfactory. The service area facilities have been delivered to the required quality standards despite challenging circumstances relating to the solvency of the main contractor.
- Conclusions can be drawn which are applicable to other service area projects. The detailed findings of this post project review include points of relevance to the planning and appraisal of future projects to provide on-line service areas. In particular:
 - The NRA Advice Note for the Location and Layout of Service Areas NRA TA 70/08 should be revised in light of the experience gained on Tranche 1, particularly in regard to the phased provision of parking. *[this has since been done and a revised TA 70 was published in March 2013]*
 - As part of the original ex-ante economic appraisal user benefits formed the vast majority of benefits associated with the MSA project. A user benefit of €3 per MSA user was used as part of the appraisal process. A survey of MSA users carried out in June 2012 revealed an average user benefit of approximately €1 per user.

- The benefits of any initiative that the state undertakes should be measured as the sum of the benefits to producers, consumers and third parties. The original ex-ante economic appraisal methodology does not take account of changes to producer surplus (PS) in the economy associated with the development of the MSAs. When account is taken of the change in producer surplus arising - owing to the existence of the MSAs - the revised appraisal out-turn confirms a positive rate of return to the MSA project, in terms of a NPV of €66.6m, a BCR of 1.5 and an IRR of 7.4%.
- Owing to the inherent difficulties associated with the measurement of producer surplus, an alternative approach to appraising the MSA project would involve the calculation of Net Benefits taking account of the costs and benefits to the state only. The alternative appraisal methodology shows that the user benefits to consumers and the safety benefits far outweigh the net cost to the state of subsidising the development of the service areas.

1 Introduction

In September 2006, the National Roads Authority (NRA) announced that it would become directly involved in the provision of on-line service areas on motorways and high quality dual carriageways. The provision of motorway service areas (MSAs) was to be undertaken in tranches. In 2007, the NRA advertised Tranche 1 comprising three service area facilities to be constructed at M1 North (near Castlebellingham); M1 South (near Lusk); and on the M4 (near Enfield). In 2009, the NRA signed a Public Private Partnership (PPP) contract with the *Superstop* consortium to build the Tranche 1 MSAs, all three double-sided facilities. The service areas, which were opened in 2010, each provide a range of service area facilities for motorists and their passengers, including parking, fuel stations, toilets, convenience shop, and restaurant/food outlet facilities.

This is a Post Project Review of these service areas. The background to this investment project was a high level of awareness among policy makers of the potential benefits of introducing such service areas. The Road Safety Authority, the National Roads Authority (NRA) and the European Commission have long advocated the benefits of Service Areas in terms of driver safety. In fact the Commission now intends to make the provision of online service areas mandatory for roads forming part of the TEN-T network. The NRA and the Commission also regard the provision of online services on motorways as an essential part of providing a proper level of service to road users. As a result the provision of on-line service areas on motorways was a strategic priority of the NRA and of the Department of Transport Tourism and Sport. A direction to this effect was issued by the Minister for Transport.

As with all public investment projects the decision to proceed with the Tranche 1 project in its final form was based on a detailed economic appraisal which culminated in a full business case. Typically the business cases produced by the NRA are associated with the benefits accruing from increases in the capacity and quality of roads. The expected benefits of such projects normally include journey time savings for road users and safety benefits from higher quality roads. Well established methods exist to place a money value on such benefits for inclusion in a business case. The business case for Tranche 1 broke new ground by being based on the value to road users of convenient on-line services and the safety benefits of providing such services to road users.

The current standards for Post Project Reviews are those set out in the Public Spending Code issued by the Department of Public Expenditure and Reform. This Code specifies that the aim of such a review is “to determine whether:

- The basis on which a project was undertaken proved correct;
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In order to answer these key questions, this post project review includes new research on the actual benefits that road users enjoyed as a result of the availability of services areas. Surveys of

the users of the service areas were carried out and the results of these surveys were used to calculate a money value for the benefits coming from the availability of these areas. The post project review is based for the most part on the actual motorway service areas transaction data for the year 2011, the first full year of operation of the MSAs, together with data obtained as part of a survey of MSA users which was undertaken in June 2012. The data obtained from the customer surveys is included in tabular form in Appendix 1.

The remainder of this ex-post review is organised as follows. Section 2 describes the location of the MSAs, as well as the nature of the MSA procurement contract and the implementation of the project. Section 3 sets out the need and objectives associated with the MSAs. Section 4 reviews the original ex-ante economic appraisal completed prior to the development of the Tranche 1 MSAs, while Section 5 reviews the validity of the assumptions underpinning the ex-ante appraisal. In Sections 6 the economic appraisal methodology is discussed and a revised methodological approach is set out which takes into account the nature of the MSA project. Section 7 reviews the operational performance of the MSAs. Finally, the conclusions are set out in Section 8.

2 OVERVIEW OF TRANCHE 1 MOTORWAY SERVICE AREA PROJECT

2.1 Introduction

As outlined above, the Tranche 1 MSA project included three motorway service area locations at:

- M1 North near Castlebellingham;
- M1 South near Lusk; and
- M4 west of Enfield.

For all three MSA sites, service area facilities were provided on both sides of the motorway, one for each direction of travel. A site selection assessment was carried out for each of the three potential service areas, taking into account the following:

- route length;
- distance from junctions to avoid traffic weaving problems;
- traffic volumes and related potential road user demand for service area facilities;
- suitability of site in terms of land holding size and general layout;
- site levels relative to the mainline;
- drainage;
- access to the local road network (to cater for construction traffic and employee access to service areas and, where appropriate, certain delivery vehicles), and
- avoidance of archaeology and other environmental constraints.

The results of these assessments are detailed in separate Site Selection Reports produced for each of the sites, the results and conclusions from which are summarised below.

2.2 M1 North and South

On the basis of a total route length of approximately 100km for the M1 and a policy target of providing service area at intervals of approximately 50-60km, it was decided as part of Tranche 1 to provide two service areas on the M1 between Dublin and the Border. The first service area location was located on the M1 section between Dublin and Balbriggan, 2.8km west of Lusk, in north County Dublin. The second M1 service area is located on the section of the M1 between Castlebellingham and Dundalk, approximately 50km from the site location for M1 South and 2.5 km to the north west of Castlebellingham, in County Louth.

2.3 M4

The provision of three service areas was considered to be appropriate for the M4/M6 Dublin to Galway route, which is approximately 200km in length. As part of Tranche 1 it was decided to provide one of these service areas on the Dublin to Kinnegad section of the M4. The service area on the M4/M6 was located approximately 2km west of the Enfield Interchange, approximately 3km west of Enfield village in county Kildare.

2.4 Procurement and Statutory Processes

Environmental Impact Statements and Compulsory Purchase Orders were prepared for each of the three service areas and submitted to An Bord Pleanála in March 2008. An Bord Pleanála held oral hearings for the proposed schemes in July 2008, one hearing for both of the M1

schemes and a separate hearing for the proposed M4 scheme. Approval for all three service areas schemes was obtained in March 2009 subject to a number of conditions specified by An Bord Pleanála.

The procurement strategy chosen for the delivery of the Tranche 1 MSA project was via Public Private Partnership (PPP). Interested parties were invited to tender for the provision of the MSAs on the basis of their proposed approaches to funding the construction and operation of the MSAs.

A total of 14 Pre-Qualification Submissions were received of which five participants were shortlisted to participate in the initial phase of the competitive dialogue process. Following receipt and assessment of Phase 1 submissions, two consortia were invited to continue in dialogue and to submit final tenders. Tenders were received from Macquarie Partnership and the Superstop consortium (comprising Petrogas Group Ltd., Top Oil and Piers Group).

In 2009 a PPP contract was agreed with the *Superstop* consortium. As part of the contract it was agreed that the NRA would contribute to the capital costs of building the MSAs, while *Superstop* would be solely responsible for funding the ongoing operation and maintenance costs during the 25 year concession period. As part of the contract a provision was made for annual minimum underwritten revenue share payments to be made by *Superstop* to the NRA. Provision was made for increased revenue share payments to be made payable to the NRA in instances where fuel, restaurant and retail sales volumes exceeded determined thresholds.

2.5 Project Implementation

The PPP contract was awarded to Superstop in October 2009. The duration of the design and construction period allowed under the contract for the delivery of all three service areas comprising six service area units (i.e. six amenity buildings, six fuel stations and associated facilities) was 12 months. The main contractor was Piers Contracting and the Employer's Representative was Halcrow Barry, who provided a site team of ten staff to monitor and administer the PPP contract during the design and construction stage.

A very good working relationship was evident between the Authority, the PPP Concessionaire, the Employer's Representative and the Contractor throughout the construction period. Despite Piers Contracting entering into examinership (and eventually leading to liquidation) towards the end of the construction contract, the three service areas all opened on programme by October 2010. The construction contract was delivered on budget (the Authority's agreed contribution of €47 million was not exceeded) and the service areas were completed to a very high standard of quality.

Since opening to the public the three service areas are being operated and maintained by Applegreen Ltd., which are the retail arm of the Petrogas Group. The three sites provide facilities on a par with those seen in continental Europe with specific services for both hauliers and private motorists.

The operation and maintenance of the Tranche 1 Service Areas is monitored by the Authority on an ongoing basis. The operator provides the Authority with monthly/annual reports which record details of all aspects of their operations including revenue. A revenue share, greater than the guaranteed minimum revenue share, has been generated and paid to the NRA each year since the service areas opened in 2010.

3 NEED AND OBJECTIVES ASSOCIATED WITH TRANCHE 1 MSA PROJECT

An extensive phase of road, and in particular motorway, infrastructure development was undertaken in Ireland over the period of the two most recent National Development Plans, which together span the years 2000 – 2013. The investment level reduced significantly however, from 2007/8 onwards, as the country suffered the effects of an economic recession.

Such was the scale of motorway development over this broad period that a growing demand emerged in Ireland for service areas along the newly developed motorway network. The demand materialised because traffic on the new motorway routes was no longer passing through towns and villages (which offered opportunities for road users to break their journeys and to avail of a range of services, including fuel and food outlets and toilet facilities). Instead, on the newly constructed motorway routes, service area facilities were only available to its users by diverting off the motorways and driving distances to reach them. There was consequently a growing consensus that the newly created network was creating a safety issue. The national Road Safety Authority at the time estimated that up to 20 per cent of fatal accidents had driver fatigue as a contributory factor.

In addition, emerging EU Directives and Regulations at the time, specifically Directive 2002/15/EC and Regulations 561/2006, were imposing limitations in respect of permissible driving times for commercial drivers. This placed an obligation on the part of the authorities with responsibility for the motorway network in Ireland to provide safe and accessible facilities where commercial drivers could take necessary rest periods.

In response to the developments above, NRA policy in respect of service areas was developed to promote the provision of safe rest locations along the new motorway network. By providing services areas, it was considered that driver fatigue related accidents would be reduced on the National primary road network, while also providing facilities to meet the rest needs of the road haulage industry.

A strategic overview of the national road network was conducted by the National Roads Authority for the purpose of identifying the optimum locations for service areas on motorways and high quality dual carriageways. A key consideration in this regard was a general objective to achieve, to the extent feasible, the siting of on-line service areas at intervals of about 50 to 60km, which equates to a typical travel time of about 30 minutes.

The policy pursued by the Authority provides for on-line service area facilities on motorways and high quality dual carriageways. This will involve the construction of service areas with direct access on and off the motorway / dual carriageway, as distinct from the alternative of being located at junctions with other roads. There are a number of factors supporting this aspect of the Authority's policy:

- (1) Access directly off the mainline is most convenient for road users and the increased convenience encourages more frequent use of service areas by drivers wishing to take rest breaks and to avail of other facilities provided.
- (2) The greater the level of usage of service facilities by drivers the greater the benefit in terms of reduced fatigue related road accidents.
- (3) Access directly off the mainline ensures the separation of longer-distance, high speed motorway and dual carriageway traffic from traffic on the local roads network resulting in road safety and traffic movement benefits.

(4) A preference for on-line service areas on roads of motorway standard is consistent with the pattern of service area provision in the UK and other European countries.

(5) The Roads Act, 1993, as amended, provides the statutory basis to regulate the provision of service areas on national roads, including motorways and dual carriageways. Under the provisions concerned, the NRA may seek the approval of An Bord Pleanála for on-line service area proposals using the service area scheme procedure set out in the Act.

The Authority developed an Advice Note TA 70/08 (published in February 2008) which sets out the basic parameters for the design of service areas. In developing standards for NRA service areas, the key objective was to devise a design layout which would prove attractive to road users so as to encourage them to avail of the service area facilities when undertaking journeys on the motorway and dual carriageway network. In order to achieve this objective, it was considered necessary to develop a layout which incorporated the typical service area facilities within a well landscaped environment, in keeping within the predominantly rural landscape within which the service areas are located and thereby minimising the visual impact of the development on its surroundings.

A basic principle in the provision of service areas is that they should not become “destinations in their own right”. The primary objective of a service area is to cater for the refuelling, rest and refreshment needs of drivers and their passengers, and it is the policy of the National Roads Authority that facilities provided in service areas cater for these needs and these needs only.

4 ESTIMATED ECONOMIC RETURN TO THE TRANCHE 1 MSA PROJECT

In 2009 Ad Astra Limited were commissioned by the NRA to complete an economic assessment of the costs and benefits associated with the Tranche 1 Motorway Service Areas in order to determine the economic viability associated with an investment in the MSAs. The original ex-ante appraisal report estimated the net benefits of the Tranche 1 motorway service area investment as follows:

Figure 1: Calculation of Net Benefits as per Original Ex-Ante Economic Appraisal

$$NB = \Delta CS + \Delta E - \Delta OPC - K$$

Where:

- CS is the consumers' surplus or user benefit
- E are the external benefits, in this case safety benefits
- OPC are the operating and maintenance costs
- K represent the capital outlay

As part of the economic appraisal the following key parameters were used:

- **Consumer Surplus**

The economic appraisal sought to determine the change in consumer surplus¹ (CS) associated with the motorway service areas - where consumer surplus represents the difference between the price consumers are willing to pay for a good/service and the actual market price. On the basis of an average consumer spend in the MSA of €24.19 (as determined by another piece of work completed by Ad Astra) it was estimated that €3, or 12.4%, of this average spend would represent consumer surplus. As part of the economic appraisal the total user benefits in 2010, as measured by consumer surplus calculated in this manner, were estimated at €13.55 million.

- **Safety Benefits**

As part of the economic appraisal the safety benefits were measured by reference to:

1. an estimated number of MSA users (assuming an anticipated turn in rate of 12 per cent and forecast traffic volumes);
2. an average vehicle km travelled of 50km (determined by reference to the average distance between any two service stations - as per NRA service area policy);
3. together 1 and 2 enabled an estimate of annual vehicle kilometres;
4. a default accident rate (as per the Project Appraisal Guidelines) was applied to the vehicle kilometres travelled (3) to determine the number of casualties associated with the motorway usage;
5. an assumption that 20 per cent of accidents are attributable to driver's fatigue was used to determine the number of casualties avoided by virtue of the MSA existence;

¹ User benefits, or consumer surplus as it is also known, is a measure of the welfare that people gain from the consumption of goods and services, or a measure of the benefits they derive from the exchange of goods. Consumer surplus is the difference between the total amount that consumers are willing and able to pay for a good or service (indicated by the demand curve) and the total amount that they actually do pay (i.e. the market price for the product).

6. the cost of casualties was then applied to the number of casualties avoided.

On the basis of the above, a 2010 value of €439,000 was estimated to reflect the value of the casualties avoided by virtue of the availability of motorway service areas in that year.

- **Operational Costs**

The estimated costs associated with the operation of the MSAs were produced by Ad Astra, in operation costs for 2010 totalled €6.24 million.

- **Capital Outlay**

The estimated total cost of construction of the MSAs, as measured by total scheme budget, totalled €126.7m including VAT.

- **Other Key Parameters**

A summary of some of the other input parameters used as part of the economic appraisal are set out in Table 1. An evaluation period of 30 years (2009-2039) was used. A traffic growth rate of 1.15 per cent per annum was assumed over the 2012-2039 period, as per the high traffic growth scenario identified. The forecast shop, restaurant and fuel sales were based on a report completed by Ad Astra.

Table 1: Summary of Input Parameters to Economic Appraisal

Project Horizon	2009 -2039
Discount factor	4.0%
Inflation rate	2.0%
Total Scheme Budget	€126.7m
Traffic (AADT) 2010	103,121
Traffic (AADT) 2039 (high growth scenario)	143,817 (1.15 % annual growth)
Annual Fuel Volumes	89.1 million litres
Shop/Restaurant sales turnover (2010 market values including VAT)	€26.5m
Traffic Turn-in ratio	12%
Consumer Surplus in 2010 (current market prices)	€13.5m
Safety Benefits in 2010 (current prices)	€439,000

Four scenarios were analysed as part of the economic appraisal. The scenarios represented differing construction costs (as represented by 'total scheme budget' and 'target cost'); and differing traffic growth scenarios. Target cost is based on total scheme budget less 15 per cent risk contingency (20 per cent in case of land). The four scenarios analysed were as follows:

- total scheme budget and high COBA traffic growth;
- total scheme budget and low COBA traffic growth (-10 per cent);
- target cost and high COBA traffic growth;
- target cost and low COBA traffic growth (-10 per cent);

When expressed in 2002 prices, and discounted using a 4 per cent discount rate, the key results of the ex-ante economic project appraisal, for the total scheme budget and traffic high growth scenario, were as follows:

Table 2: Results of Ex-Ante Economic Appraisal

	High Traffic Growth Scenario
Net Present Value	€24.2m
Benefit Cost Ratio	1.16
Internal Rate of Return	6.09%

As such, the original appraisal process confirmed the economic viability of the project. It should be noted that consumers' surplus was the major user benefit element associated with the MSAs. The ex-ante economic appraisal report acknowledged that the true user benefits could only be established after the service areas were opened and that the estimates used in the appraisal were therefore subject to error.

5 Validity of Assumptions Underpinning Original Ex-Ante Economic Appraisal

In this Section we review the validity of some of the key assumptions underpinning the original ex-ante economic appraisal.

- **Number of MSA Users**

The economic appraisal contained traffic predictions over a 30 year period covering 2009 to 2039. The traffic predictions relating to 2011 are set out in Table 3. Using traffic count data available from the NRA, actual AADT traffic volumes for 2011 are available, as set out in Table 3. As the Table outlines, to date actual traffic volumes are marginally below those predicted. The AADT at the locations of the MSAs in 2011 was some 4% below that predicted as part of the economic appraisal;

Table 3: Forecast versus Actual Traffic Volumes

	AADT (2011) Forecast	AADT (2011) Actual	Difference
M1 North	28,764	26,304	-8.6
M1 South	53,479	51,289	-4.1
M4	20,878	21,497	3.0
Total	103,121	99,090	-3.9

The economic appraisal assumed a turn-in rate of 12 per cent at each MSA location. Actual turn-in rates at each individual MSA were as set out in Table 4, namely M1 North: 11.8 per cent; M1 south: 7.9 per cent; and M4: 15.6 per cent. The weighted average turn-in rate is 10.6 per cent.

Table 4: Forecast versus Actual Turn-in Rates

	Forecast Turn in Rate (2011) %	Actual Turn in Rate (2011) %	Difference
M1 North	12.0	11.83	-0.2
M1 South	12.0	7.93	-4.1
M4	12.0	15.56	+3.6
Average (weighted)		10.62	

On the basis of the forecast and actual AADT volumes and turn-in rates as set out in Tables 3 and 4 it can be seen that the actual number of MSA users is 15 per cent below that forecast as per the original economic appraisal.

Table 5: Forecast versus Actual Daily Number of MSA Users

	Forecast No Daily Users (2011)	Actual No Daily Users (2011)	Difference %
Total No Users	12,375	10,524	-15%

- **Fuel and Retail/Restaurant Sales**

Fuel purchases are 19 per cent below those predicted for 2011 (see Table 6); while other retail/restaurant sales are down by some [12%] (see Table 7).

Table 6: Forecast versus Actual Fuel Volume Sales

	Forecast Volumes (2011)	Actual Volumes (2011)	Difference %
Fuel Volumes (litres)	84,914	69,045	-18.7

Table 7: Forecast versus Actual Retail/Restaurant Sales

	Forecast Sales € (2011)	Actual Sales € (2011)	Difference %
Restaurant and Retail Sales (including VAT)	27,508	24,686	-10.3

Actual 2011 retail/restaurant sales were obtained from the Operator's 2011 annual report to the NRA. The value of sales provided are exclusive of VAT. As per the original ex-ante appraisal, an aggregate of 10 per cent VAT was assumed.

- **User Benefits – Consumer Surplus**

As outlined in Section 4, as part of the original economic appraisal an average user spend at the MSAs of €24.19 was assumed. It was also assumed that €3 of this expenditure would represent 'user benefits' or consumer surplus. With regard to the CS, the economic appraisal acknowledged that the true user benefits could only be established after the service areas were opened and that the estimates were therefore subject to error.

In addressing the issue of the CS to be attributed to the motorway service areas, it should be recognised that the CS is only very indirectly related to the average spend at the MSAs. This is because the CS properly attributable to the MSAs is not the CS related to the goods and services purchased, as these purchases could take place (at some other service area) if the MSAs were not built. Rather, the CS arising from the existence of the MSAs reflects the convenience of the MSAs to users as compared with having to locate alternative facilities.

As part of this ex-post evaluation of the economic return to the service areas, the approach to measuring the actual CS reflects this view by essentially seeking to uncover what the users would have done in the absence of the MSAs. In particular, some users would have had to leave the motorway to access other facilities available off the routes in question. These users would thus have incurred time and money penalties and consequently have a reduced consumer surplus. From this viewpoint, the CS associated with the MSAs is more a reflection of the inconvenience created for users by virtue of the absence of the MSA facilities.

To measure the CS in the manner described here, in June 2012, approximately 20 months after their opening, a survey was implemented at each of the Tranche 1 MSA locations. As part of the survey, approximately 600 service area users were questioned, as they exited the MSA buildings, in relation to various aspects of their usage of the motorway service areas. Specifically, the MSA users were questioned about their actions in the absence of the MSA, to establish the MSA users that would have:

- deviated from their planned route to locate an alternative service area;
- stopped off at another service area along their planned route without deviating from their planned route;
- not stopped (choosing to re-fuel and/or make their purchases at the beginning or end of their journey).

Using the survey results the time savings for the MSA users stating they would have deviated from their planned route were calculated. The journey minutes saved were calculated on the basis of the time required to access (and return to the motorway from) the next available service area available by deviating off the relevant routes. To determine the total CS associated with the MSA in this manner the follow steps were undertaken:

Figure 2: Calculation of Consumer Surplus

- The AADT associated with each MSA was identified
- The turn-in rate was used to determine the number of daily vehicle users of the MSAs
- An average vehicle occupancy rate was used to estimate the actual number of MSA users
- As per the survey results, the number of daily MSA users was split according to whether they represented:
 - a. Users that deviated from their planned route to locate an alternative service area;
 - b. Users that would have stopped off at another service area along their route without deviating from their route.
 - c. Users that stated they would not have stopped;

In relation to users falling into group **a**:

- Using the survey results, the users were split into 'leisure'; 'commuter'; and 'travelling in the course of work' users
- The number of journey minutes saved (by virtue of the existence of the MSA) was determined by calculating the number of minutes required to reach the next available service area off the motorway network and subsequently return to the motorway network
- The aggregate value of time savings was estimated by applying the appropriate values of time to the journey time savings and grossing-up by the total number of users.
- Annual time savings were calculated for each year of the evaluation period applying growth factors where appropriate (i.e. traffic growth factors; value of time growth factors).

In the case of users falling into user groups **b** and **c**:

- a rule of 50 per cent of time savings was applied to users falling into these two categories, on the basis that they are availing of some benefits by virtue of their decision to use the MSAs

On the basis of steps set out in Figure 2 (which are set out diagrammatically in Figure 3) the total time savings associated with usage of the MSA were calculated. This permitted the calculation of an average time saving per MSA user at each MSA location. The results of the analysis are set out in Table 8. Across the three MSAs, average time savings averaged approximately €1 per user. This compares with a value of €3 which was used in the original ex-ante economic appraisal.

Table 8: Actual User Benefits

	User Benefit 2011 (Forecast €)	User Benefit 2011 (Actual €)	Difference %
M1 North	3.00	1.18	-60.6
M1 South	3.00	0.77	-74.3
M4	3.00	1.03	-65.7
All	3.00	0.97	-68.3

It should also be noted that there are other potential benefits associated with the MSAs that have not been captured above. MSA users may for example value other aspects of the MSA availability such as a wider range of goods and services than is available at other service areas... Other potential benefits include the existence of Garda enforcement areas at the MSAs; and the residual life of the MSAs at handback.

A further noteworthy aspect of the calculation of benefits above is that they relate to users of the MSAs only. It is conceivable that some benefit may accrue to non-users. That is the latter may value the existence of the MSAs as a standby. These benefits have also not been measured here.

Taking these aspects into account, the approach taken to the measurement of CS for MSA users above may be considered to result in a minimum estimate.

- **Safety Benefits**

As described in Section 4, the safety benefits associated with the provision of MSAs were calculated as follows:

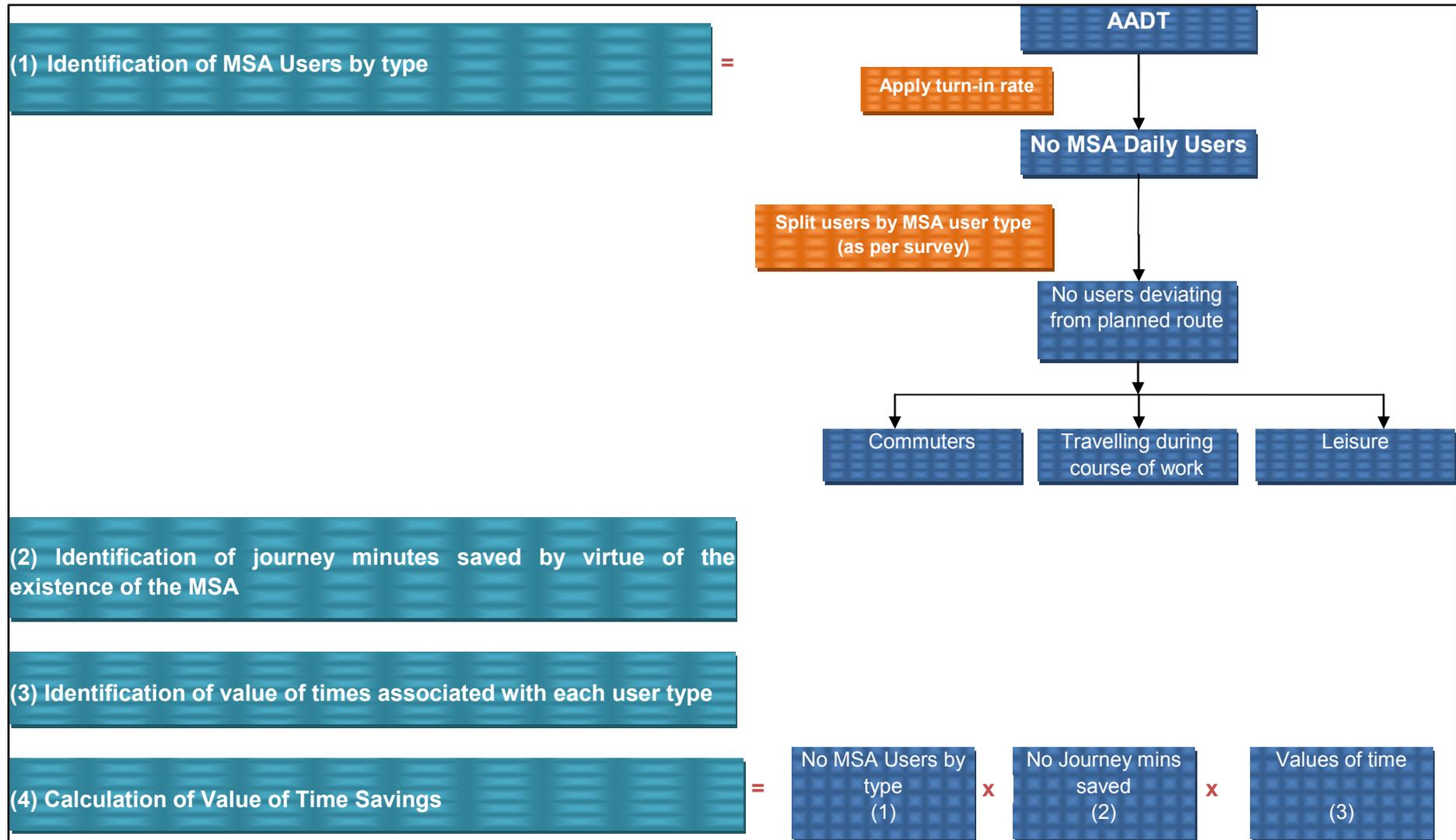
Figure 4: Calculation of Safety Benefits as per Original Ex Ante Economic Appraisal

SB = Akm * a * f * c

Where:

- SB - are the safety benefits
- Akm – represents the annual average vehicle kilometres
- a – represents the accident rate associated with road usage
- f – represents the proportion of accidents attributable to fatigue
- c – represent the values associated with casualties

Figure 3: Calculation of Consumer Surplus Methodology for Users deviating from their Planned Route



The annual vehicle kilometres were calculated based on the estimated number of vehicles turning in to the MSA multiplied by an average distance of 50 km which was based on the average distance between any two motorway service stations (as per NRA policy). The average vehicle kilometres were then multiplied by the number of days in the year. It was assumed that 20 per cent of accidents, which are caused due to driver's fatigue, would be saved by the implementation of motorway service areas by providing safe places for drivers to stop and rest.

On the basis of the methodology employed to the calculation of safety benefits, it is considered that the actual value of the safety benefits is likely to be in excess of values estimated in the original ex-ante appraisal. This is because in calculating the safety benefits, the average distance of journeys undertaken on national primary routes should have been used as part of the calculation rather than the average distance between any two motorway service areas. It is considered likely that the average journey distance on national primary routes is in excess of 50km. Hence, the value of safety benefits used in the ex-ante evaluation are likely to represent some proportion of the actual safety benefits associated with the provision of MSAs.

6 Suitability of the Appraisal Process

6.1 Introduction

In this Section the economic appraisal methodology is discussed and a revised methodological approach is set out.

6.2 Revised Methodology Incorporating Producer Surplus

The benefits of any initiative that the state undertakes should be measured as the sum of the benefits to producers, consumers and third parties. That is, the benefits are the sum of:

- The changes in consumers' surplus (CS);
- The changes in producers' surplus (PS)²; and
- The net change in external effects (E)³.

The benefits should thus be calculated as set out in Figure 5.

Figure 5: Methodology for Calculation of Net Benefits 1

$NB = \Delta CS + \Delta PS + \Delta E$

Where:

- CS is the change in the consumers' surplus or user benefit
- PS is the change in producer surplus
- E are the external benefits associated with the project

As we saw in Section 4 the original ex-ante appraisal of the Tranche 1 motorway service areas estimated benefits as the sum of the first (ΔCS) and third (ΔE) components only, with safety benefits comprising the external effects measured. In effect, the failure to include the producers' surplus meant that net revenues arising from the service areas were excluded from the analysis.

In simple terms, if we were to consider that the state procured the MSAs conventionally and they were operated by the NRA, then the financial value or producer's surplus of the MSA project for the NRA would be calculated as set out in Figure 6. The FV could be negative implying a loss to the NRA, or positive implying a profit. If negative, then investment in the MSAs would only be economically advantageous if the other benefits (CS and E) are large.

² Producer surplus is economic measure of the difference between the amount that a producer of a good receives and the minimum amount that he or she would be willing to accept for the good. The difference, or surplus amount, is the benefit that the producer receives for selling the good in the market.

³ External effects relate to the benefits and costs which arise when the social or economic activities of one group of people have an impact on another, and when the first group fails to fully account for their impacts. By definition, externalities are not included in market pricing calculations and, therefore it can be concluded that private calculations of benefits or costs may differ substantially from society's valuation if substantial external effects occur.

Figure 6: Methodology for Calculation of Financial Value

FV (i.e. ΔPS) = NR – OPC – K

Where:

- FV is the financial value (i.e. producer surplus)
- NR is the net revenue after cost of sales
- OPC are the operating and maintenance costs
- K represents the capital outlays

In reality however, the total change in PS is not measured by the MSA FV alone: rather there is a need to take account of the loss of producers' surplus as spend is diverted from other parts of the economy to the newly developed MSAs. The most relevant such diversion is from other existing service areas. This is a valid assumption as the MSAs are better placed to gain custom. The Net Benefit calculation thus becomes:

Figure 7: Methodology for Calculation of Net Benefits 2

NB = $\Delta CS + \Delta PS_f + \Delta PS_o + \Delta E$

Where:

- CS is the change in the consumers' surplus or user benefit
- PS_f is the change in producer surplus for the MSA franchisee
- PS_o is the change in producer surplus for other businesses
- E are the external benefits associated with the project

Or, more specifically:

Figure 8: Methodology for Calculation of Net Benefits 3

NB = $\Delta CS + (\Delta NR_f - OPC_f - K_f) + \Delta PS_o + \Delta E$

Where:

- CS is the change in the consumers' surplus or user benefit
- NR_f is the franchisee's net revenue after cost of sales
- OPC_f are the franchisee's operating and maintenance costs
- K_f represents the capital outlays payable by the franchisee
- PS_o is the change in producer surplus for other businesses in the economy
- E are the external benefits associated with the project

It is instructive to consider another scenario: viz. that the NR gain to the MSA diverts expenditure from across the economy generally. In this scenario, it can be assumed that all other producers will be marginally affected and will be able on average to reduce their operating costs in line with their loss of NR. In this situation, the loss of producers' surplus elsewhere in the economy will be determined by the profitability of enterprises across the economy as a whole. Based on I-O

tables⁴ the profitability of the retail sector as a percentage of NR is some 35 per cent. This would imply that the full change in producers' surplus would be measured as:

Figure 9: Refined Calculation of Producer Surplus

$PS = 0.65NR - OPC - K$

Where:

- PS is the producer surplus
- NR is the net revenue after cost of sales
- OPC are the operating and maintenance costs
- K represents the capital outlays

The MSA survey results indicate that while some existing service areas adjacent to the motorway have been affected, the bulk of the diversion in spend would have come from a wide range of sources e.g. in the absence of the MSAs some motorway users would not have made a purchase on their motorway trip at all. Thus, the change in PS could be relative close to the above. The net benefits would then become:

Figure 10: Refined Methodology for Calculation of Net Benefits

$NB = \Delta CS + 0.65NR - OPC - K + \Delta E$

Where:

- CS are the consumer surplus
- NR is the net revenue after cost of sales
- OPC are the operating and maintenance costs
- K represents the capital outlays
- E are the external benefits

On the basis of the methodology set out in Figure 10, the Net Benefits associated with the MSAs were re-calculated. As part of the calculation, actual user benefits as calculated as part of the survey of MSA users were used. Net Revenues, as set out in the ex-ante financial appraisal, adjusted to add VAT, remove the effect of inflation, and to reflect actual sales performances were used. In a similar fashion O&M costs adjusted to remove the effect of inflation and to reflect actual sales performances were used. The safety benefits and total scheme budget as estimated as part of the economic appraisal were also used. The resulting project outturn was as set out in Table 10.

⁴ The Central Statistics Office ("CSO") compiles an overall picture of the way in which the output of the economy is built up in this way. This is referred to as an Input-Output model of the economy. This model shows how the output of each sector of the economy is used as inputs for the other sectors of the economy, and how an increase in the output of one sector of the economy will lead to an increase in the demand for the outputs of the other sectors of the economy. This information is presented in a variety of formats by the CSO in its periodic publication of Input-Output tables for the Irish economy.

Table 10: Ex-Post Economic Appraisal using Revised Methodology

	Scenario 1
Net Present Value	€66.6m
Benefit Cost Ratio	1.5
Internal Rate of Return	7.4

This estimate is at 2010 prices using a 4 per cent discount factor. The revised economic appraisal indicates that a positive economic return is likely to arise from the project over its lifetime. This revised economic appraisal method should be applied in the evaluation of the next tranche of service areas.

6.3 Alternative Appraisal Methodology

The methodology set out in Section 6.2 assumes knowledge of producer surplus values. It is however inherently difficult to measure changes in producer surplus. An alternative approach to appraising MSA projects would not require such measurement. It could be argued that the change in producers’ surplus is not a concern of the state as the alteration in spending patterns is simply a response to a new competitive environment. What matters is whether the change in CS and E yields sufficient benefits to cover *the costs to the state of providing the MSAs*.

As part of the PPP contract signed with the MSA Operator the NRA contributed to the capital costs of building the MSAs, while the Operator was solely responsible for funding the ongoing MSA operation and maintenance costs. As part of the contract annual minimum underwritten revenue share payments were payable by the Operator to the NRA. Provision was made for increased payments to be made payable to the NRA in instances where fuel, restaurant and retails sales volumes exceeded determined thresholds.

On this basis, the costs to the State of the MSA project are the up-front financial subsidy that the MSA operator required less the stream of royalties that arise to the state (NRA). Thus, the calculation of net benefit becomes:

Figure 10: Calculation of Net Benefits as per Alternative Economic Appraisal Methodology

NB = ΔCS + Δ E – KS + RS

Where:

- CS is the change in the consumers’ surplus or user benefit
- E are the safety benefits arising from the projects
- KS represents the capital outlays attributable to the State
- RS represent the royalty stream payable to the State

Note: The full capital costs and the operating costs are not relevant as they are incurred by the private operator.

As part of the calculation, actual user benefits as measured as part of the survey of MSA users were used. The capital costs used are those contributed by the NRA towards the capital costs of construction (including land costs); whilst the safety benefits used are those estimated as part of the economic appraisal. Finally, for each year of the economic appraisal period the higher of the following two values was used to reflect the royalty payments payable to the NRA:

- the 2011 royalty payment adjusted upward annually by an estimated ten percent;
- the underwritten annual royalty payments as per the PPP contract.

The resulting project outturn was as set out in Table 11. This estimate is at 2010 prices using a 4 per cent discount factor.

Table 11: Ex-Post Economic Appraisal using Alternative Appraisal Methodology

Net Present Value	€79.7
Benefit Cost Ratio	2.2
Internal Rate of Return	11.0%

The alternative appraisal confirms that a positive economic return is likely to arise from the project over its lifetime. The calculation shows that the user benefits to consumers and the safety benefits far outweigh the net cost to the state of subsidising the development of the service areas. This does not however mean that such subsidies are required in the future.

7 Operational Performance of Motorway Service Areas

As part of the PPP contract (Part 2 of Schedule 7) the MSA Operator agreed operational performance criteria with the NRA. The concessionaire agreed for example to:

- Maintain and operate all public areas in a clean and tidy manner, consistent with good industry practice;
- Provide a high level of customer service in a comfortable environment;
- Initiate and maintain a mystery shopper programme to monitor the services and facilities provided within the MSA;
- Submit an annual review of the availability of facilities at the MSA by the time of day, day of week and week of year;
- Provide minimum levels of service as measured by:
 - maximum allowable queue lengths at fuel dispensers;
 - staffing levels at restaurant point of sales and minimum queue lengths in accordance with the good industry practice
 - availability of toilet and shower facilities
- Review and benchmark their fuel prices against other reference sites

Operation reports are provided by the Operator to the Authority on a monthly and annual basis. Sample annual and monthly monitoring reports were examined and indicate compliance with the performance criteria as set out in the PPP contract.

It is of note also that a high level of customer satisfaction was reported by MSA customers as part of the MSA survey, in terms of their views of the level of service provided by the MSAs. When asked if the MSA stop represented their preferred stopping point along their journey, across all three MSAs where respondents were surveyed, 84 per cent of MSA users stated that the MSA was their preferred stopping point.

Table 12: Distribution of Users identifying MSA as Preferred Stopping Point

	All (%)	M4 (%)	Lusk (%)	Castlebellingham (%)
<i>MSA preferred stop</i>				
Preferred	84.2	90.0	74.6	87.9
Not preferred	15.8	10.0	25.4	12.1
	100.0	100.0	100.0	100.0

When questioned in relation to their views surrounding the quality of facilities provided at the MSAs, across all MSA users a total of 93 per cent of users stated that they found the MSAs to be at least of 'above average standard', with 55 per cent of users rating the facilities as 'excellent'.

Table 13: Distribution of All MSA Users by Views of Quality of MSA Facilities

	Food (%)	Toilet (%)	Car Parking (%)	Amenity Building (%)	Overall Impression (%)
<i>All MSA Users</i>					
Excellent	36.6	44.3	46.7	49.2	54.4
Above Average	41.0	45.1	44.5	44.6	39.1
Rest	22.4	10.6	8.8	6.2	6.5
	100.0	100.0	100.0	100.0	100.0

Finally, when questioned in relation to their views of the price competitiveness associated with the MSA offering, across the three MSAs a total of 54 per cent of users asserted that they ‘agreed slightly’ with the assertion that “prices charged at this service area are competitive”, with a further 32 per cent of users agreeing strong with the assertion. In total, approximately 14 per cent of users did not agree with the assertion.

Table 14: Distribution of All MSA Users by Views of Price Competitiveness of MSAs

	All	M4	Lusk	Castlebellingham
<i>Competitive Prices</i>	%	%	%	%
Agree Strongly	32.2	39.8	33.5	23.4
Agree Slightly	53.6	43.1	53.1	64.5
Disagree Slightly	12.3	15.6	12.0	9.3
Disagree Strongly	1.9	1.4	1.4	2.8
	100.0	100.0	100.0	100.0

8 Conclusions

In September 2006, the National Roads Authority (NRA) announced that it would become directly involved in the provision of on-line service areas on motorways and high quality dual carriageways. In 2009 the NRA entered a contract with the *Superstop* consortium to build three MSAs - at M1 North (near Castlebellingham); M1 South (near Lusk); and on the M4 (near Enfield) – as part of the Tranche 1 MSA Project. This is a Post Project Review of these service areas.

The current standards for Post Project Reviews are those set out in the Public Spending Code issued by the Department of Public Expenditure and Reform. This Code specifies that the aim of such a review is “to determine whether:

- The basis on which a project was undertaken proved correct;
- The expected benefits and outcomes materialised;
- The planned outcomes were the appropriate responses the actual public needs;
- The appraisal and management procedures adopted were satisfactory; and,
- Whether conclusions can be drawn which are applicable to other projects, to the ongoing use of assets, or to associated policies.”

In order to answer these key questions, this post project review included new research on the actual benefits that road users enjoyed as a result of the availability of services areas. Surveys of the users of the service areas were carried out and the results of these surveys were used to calculate a money value for the benefits coming from the availability of these areas. Using the results of this research the post project review was able to confirm that:

- The service areas have produced significant benefits for road users and the economy as a whole. The basis for the project was one of improved driver safety and public convenience for motorists. These benefits are being borne out by the fact that a significant and growing number of road users are availing of the facilities provided. Additionally the planned TEN-T regulations will now require online service areas to be provided on the core network. Therefore the basis on which the project was undertaken has proven to be correct;
- The level of benefits and the number of road users availing of the service areas are sufficiently high that the high net benefits expected at the appraisal stage have been realised. The expected outcomes were a) that a particularly high level of service could be ensured through specific contractual requirements; b) that a significant proportion of road users would avail of the service; and c) that the exchequer's capital contribution would be recovered through revenue share payments. A high level of customer satisfaction with the quality and range of services on offer is apparent from the data collected in the MSA User Survey. Although the traffic volumes on the relevant sections of motorway are less than originally predicted (in the order of 4%), the numbers availing of the facilities has continued to increase year on year since opening. Revenue share payments to the Authority are continually above the guaranteed minimum provided for in the PPP contract and therefore the direct financial return is in line with expectations. All in all the expected level of benefits have in fact materialised;

- Although the facilities are well utilised at busy times the level of parking provision at each of the service areas is generally ahead of current need. The service area facilities were designed to a 15 year horizon, but a phased provision of the required parking need should probably have been implemented over this period. The costs have been at the level expected and the benefits have been as large as expected. Therefore the project represented the high level of value for money expected at the appraisal stage, i.e. the project had been an appropriate and proportionate response to a real public need;
- The review of processes carried out as part of this post project review confirmed that the appraisal and management procedures adopted by the NRA had been satisfactory. The service area facilities have been delivered to the required quality standards despite challenging circumstances relating to the solvency of the main contractor.

Conclusions can be drawn which are applicable to other service area projects. The detailed findings of this post project review included points of relevance to the planning and appraisal of future projects to provide on-line service areas. In particular:

- An analysis of the key assumptions underpinning the economic appraisal revealed:
 - the AADT at the location of the MSAs in 2011 was only 4% below that predicted in the economic and financial appraisals;
 - actual turn-in rates were M1 North: 11.8%; M1 south: 7.9%; and M4: 15.6%, compared to the predicted turn-in rate of 12%. The weighted average turn-in rate was 10.6%;
 - as a result of this, the daily number of users of the MSAs in 2011 was 15% down on the predicted number of users; and,
 - Fuel purchases are 18% below those predicted for 2011 (69m vs 85m litres), while other retail sales are down by some 12%.
- The NRA Advice Note for the Location and Layout of Service Areas NRA TA 70/08 should be revised in light of the experience gained on Tranche 1, particularly in regard to the phased provision of parking. *[this has since been done and a revised TA 70 was published in March 2013]*
- As part of the original ex-ante economic appraisal user benefits formed the vast majority of benefits associated with the MSA project. A user benefit of €3 per MSA user was used as part of the appraisal process. A survey of MSA users carried out in June 2012 revealed an average user benefit of approximately €1 per user.
- The benefits of any initiative that the state undertakes should be measured as the sum of the benefits to producers, consumers and third parties. The original ex-ante economic appraisal methodology does not take account of changes to producer surplus (PS) in the economy associated with the development of the MSAs. When account is taken of the change in producer surplus arising - owing to the existence of the MSAs - the revised appraisal out-turn confirms a positive rate of return to the MSA project, in terms of a NPV of €66.6m, a BCR of 1.5 and an IRR of 7.4%.
- Owing to the inherent difficulties associated with the measurement of producer surplus, an alternative approach to appraising the MSA project would involve the calculation of

Net Benefits taking account of the costs and benefits to the state only. The alternative appraisal methodology shows that the user benefits to consumers and the safety benefits far outweigh the net cost to the state of subsidising the development of the service areas.

Appendix 1 – Tranche 1 Motorway Service Area Customer Survey

A survey was conducted in June 2012 at each of the three Tranche 1 MSA locations. As part of the survey a total of 634 persons were surveyed, approximately 200 persons were interviewed at each location, or approximately 100 persons at each MSA facility. The participants in the survey were queried in relation to the purpose of their journey; the frequency with which they make the journey; their preferred places to stop on motorway journeys; what their behaviour would have been in the absence of the MSA facilities; as well as their assessment of the quality of the MSA facilities on offer.

Journey Details

As illustrated in the Table 1, car users comprise the majority of persons stopping at the MSAs, accounting for 78 per cent of users across the three routes. Lusk represented the MSA with the highest proportion of van and truck users.

Table 1: Distribution of MSA Users by Vehicle Type

	All (%)	M4 (%)	Lusk (%)	Castlebellingham (%)
<i>Vehicle type</i>				
Car	77.9	86.3	66.0	81.3
Van	13.9	8.5	21.5	11.7
Truck	8.2	5.2	12.4	7.0
	100.0	100.0	100.0	100.0

Table 2 sets out the distribution of MSA users by their journey purpose. The table shows that approximately half of all persons using the three MSAs were travelling for leisure purposes. The MSA at Enfield on the M4 had the highest proportion of leisure users (56 per cent). At all three MSA locations the proportion of MSA users represented by persons going to or coming from work was in excess of 30 per cent, reaching 43 per cent at Castlebellingham.

Table 2: Distribution of MSA Users by Reason for Travel

	All (%)	M4 (%)	Lusk (%)	Castlebellingham (%)
<i>Reason for travel</i>				
Travelling during course of work/business	14.2	12.3	21.1	9.3
Going to/coming from work/business	34.9	30.8	31.1	42.5
Leisure/Other	50.9	56.9	47.8	48.1
	100.0	100.0	100.0	100.0

As part of the survey the survey respondents were asked to specify the frequency with which they make their (then current) journey. Table 3 sets out the distribution of journey frequencies among the MSA users surveyed. From the table it can be seen that on average 60 per cent of persons complete their journey on at least a monthly basis, with approximately 40 per cent of users completing their journey at least weekly. The motorway by Castlebellingham had the highest rate of daily users, at 16 per cent.

Table 3: Distribution of MSA Users by Journey Frequency

	All (%)	M4 (%)	Lusk (%)	Castlebellingham (%)
<i>Frequency of travel</i>				
Daily	10.9	8.5	8.1	15.9
Weekly	27.8	19.9	35.4	28.0
Monthly	21.5	23.2	15.3	25.7
Other	39.9	48.3	41.1	30.4
	100.0	100.0	100.0	100.0

Tables 4 and 5 present a distribution of journey times, in terms of journey times already completed prior to arriving at the MSA (Table 4), as well as remaining journey times for each MSA user (Table 5).

As set out in Table 4 it can be seen that on average 60 per cent of MSA users stopped to use the MSA facilities within one hour of commencing their journey. On average 65 per cent of MSA users anticipated a journey time of no more than 60 minutes after leaving the MSA. The M4 MSA users reported the highest proportion of users who expected *at least* another hour on their journey time, at 45 per cent.

Table 4: Distribution of MSA Users by Elapsed Journey Times

	All (%)	M4 (%)	Lusk (%)	Castlebellingham (%)
<i>Elapsed Journey Time</i>				
<60min	59.9	56.4	62.7	60.7
>60min	40.1	43.6	37.3	39.3
	100.0	100.0	100.0	100.0

Table 5: Distribution of MSA Users by Remaining Journey Times

	All (%)	M4 (%)	Lusk (%)	Castlebellingham (%)
<i>Remaining Journey Time</i>				
<60min	65.9	55.5	67.9	74.3
>60min	34.1	44.5	32.1	25.7
	100.0	100.0	100.0	100.0

Service Areas Usage

As part of the survey the MSA users were asked if they stopped frequently for service areas facilities on their present route. Table 6 presents a distribution of responses provided to this question. As can be seen from the table, on average, 72 per cent of respondents said they stopped regularly when making their journey. MSA users at Castlebellingham reported the highest tendency to stop on their journey (76 per cent stop regularly).

Table 6: Distribution of MSA Users by Stopping Frequency at MSA Services

	All (%)	M4 (%)	Lusk (%)	Castlebellingham (%)
<i>Stop Frequency</i>				
Regularly	71.6	70.1	68.4	76.2
Occasionally	23.7	26.1	25.4	19.6
Emergency	1.4	1.4	2.4	0.5
Low on fuel	3.3	2.4	3.8	3.7
	100.0	100.0	100.0	100.0

When questioned as to whether the Motorway Service Area represented their preferred stopping point along their present journey, across all three MSA 84 per cent of respondents stated the MSA was their preferred stopping point. The reported preferences varied between 75 per cent (at Lusk) to 90 per cent (at Enfield).

Table 7: Distribution of Users identifying MSA as Preferred Stopping Point

	All (%)	M4 (%)	Lusk (%)	Castlebellingham (%)
<i>MSA preferred stop</i>				
Preferred	84.2	90.0	74.6	87.9
Not preferred	15.8	10.0	25.4	12.1
	100.0	100.0	100.0	100.0

When questioned as what their behaviour would have been in the absence of the MSA, across the three MSAs a total of 66 per cent of users stated they would have stopped at alternative services in the absence of the MSA. This percentage was lowest at Lusk, 60 per cent, and highest at Enfield, 76 per cent.

Table 8: Proportion of MSA Users Stopping at Alternative Facilities in absence of MSA

	All (%)	M4 (%)	Lusk (%)	Castlebellingham (%)
<i>In absence of MSA would have stopped</i>				
Yes	66.4	75.8	60.3	63.1
No	33.6	24.2	39.7	36.9
	100.0	100.0	100.0	100.0

As part of the survey the MSA users specifying that they would have stopped off elsewhere in the absence of the MSA were then asked if stopping off elsewhere would have necessitated a deviation from their planned route. Of those stating they would have made a stop regardless of the presence of an MSA, 48 per cent said that their stop would have brought them off their

planned route. This proportion was highest among the M4 MSA users, where 69 per cent of respondents stated they would have left their planned route.

Table 9: Proportion of MSA Users Leaving Planned Route

	All (%)	M4 (%)	Lusk (%)	Castle-bellingham (%)
<i>Of those who would stop, would you leave your planned route?</i>	%	%	%	%
Yes	48.0	68.8	32.5	37.8
No	45.4	25.0	60.3	55.6
Don't Know	6.7	6.3	7.1	6.7
	100.0	100.0	100.0	100.0

MSA Services Availed Of

Table 10 sets out the proportion of MSA users availing of the various facilities available at the MSAs. The highest proportion of MSA users reported availing of toilet facilities, followed by fuel and restaurant services. As can be seen from the table, 57 per cent of all users stopping at the MSAs avail of toilet facilities and refuelling services. The MSA at Castlebellingham had the proportion of users availing of refuelling services, at 68 per cent.

Table 10: Proportion of MSA Users Availing of Individual MSA Services

	All (%)	M4 (%)	Lusk (%)	Castlebellingham (%)
<i>Services availed of</i>				
Fuel	56.5	55.5	45.9	67.8
Restaurant	55.4	69.2	48.3	48.6
Retail	47.9	45.0	36.8	61.7
Toilet	56.9	72.5	38.3	59.8

Table 11 sets out the distribution of users by their main reason reported for stopping at the MSA. The table shows that 45 per cent of users identified refuelling as their primary reason for stopping at the MSA. Castlebellingham had the highest proportion of users stopping primarily for fuel, at 56 per cent.

Table 11: Proportion of MSA Users by Main Reason for Stopping at MSA

	All (%)	M4 (%)	Lusk (%)	Castlebellingham (%)
<i>Main purpose of stop</i>				
Fuel	45.1	37.4	41.6	56.1
Rest	26.0	36.5	25.4	16.4
Retail	12.6	8.5	14.8	14.5
Toilet	13.4	16.1	12.9	11.2
Other	2.8	1.4	5.3	1.9
	100.0	100.0	100.0	100.0

Table 12 sets out the average expenditure per user at each MSA. As can be seen from the Table, the average expenditure across all users totalled €40, with €29 of that being spent on fuel. Castlebellingham users reported the highest average spends, at €46, and also the highest reported spend on fuel, at €36.

Table 12: Average Expenditure at MSA by Expenditure Category

	All (€)	M4 (€)	Lusk (€)	Castlebellingham (€)
<i>Average Spend</i>				
Fuel	29	24	28	36
Rest	7	8	4	6
Retail	4	3	7	5
All	40	34	39	46

On average, MSA users spent 18 minutes in the MSAs. MSA users spent on average the least amount of time in the Castlebellingham MSA (13.5 minutes).

Table 13: Distribution of MSA Users by Number of Minutes Spent at MSA

	All (%)	M4 (%)	Lusk (%)	Castlebellingham (%)
<=5	24.3	8.6	30.6	33.6
6-10	25.3	17.6	23.4	34.6
11-20	25.0	33.8	23.0	18.2
21-60	24.5	39.0	21.5	13.1
>60	0.9	1.0	1.4	0.5
<i>Average Time (number of mins)</i>	17.7	22.9	16.8	13.5

Quality of MSA Services

As part of the survey respondents were asked to provide their views regarding the quality of service provided at the MSAs. Tables 14 -17 set out the responses provided for all MSA users followed by Enfield, Lusk and Castlebellingham MSA users respectively.

As set out in Table 14, across all MSAs, 93 per cent of users stated they found the MSAs to be at least of *above average* standard, with 55 per cent of users rating the facilities as *excellent*.

Table 14: Distribution of All MSA Users by Views of Quality of MSA Facilities

	Food (%)	Toilet (%)	Car Parking (%)	Amenity Building (%)	Overall Impression (%)
<i>All MSA Users</i>					
Excellent	36.6	44.3	46.7	49.2	54.4
Above Average	41.0	45.1	44.5	44.6	39.1
Rest	22.4	10.6	8.8	6.2	6.5
	100.0	100.0	100.0	100.0	100.0

Among the M4 Enfield MSA users, the overall impression reported was very favourable, with 63 per cent of users rating the overall facilities as *excellent*. Among the M4 MSA users, the quality of services was rated lowest with respect to food, with 25 per cent of users rating the food service at *average* or *below average*.

Table 15: Distribution of M4 MSA Users by Views of Quality of MSA Facilities

	Food (%)	Toilet (%)	Car Parking (%)	Amenity Building (%)	Overall Impression (%)
<i>M4</i>					
Excellent	44.5	53.1	54.5	58.8	63.0
Above Average	30.8	34.6	35.1	36.5	29.9
Rest	24.6	12.3	10.4	4.7	7.1
	100.0	100.0	100.0	100.0	100.0

Forty-five per cent of MSA users surveyed at Lusk MSA reported finding the facilities to be *excellent*. Similar to the Enfield M4 MSA, one quarter (26 per cent) of MSA users at Lusk rated the food service as *average* or *below average*.

Table 16: Distribution of Lusk MSA Users by Views of Quality of MSA Facilities

	Food (%)	Toilet (%)	Car Parking (%)	Amenity Building (%)	Overall Impression (%)
<i>Lusk</i>					
Excellent	28.0	33.0	35.9	40.7	45.0
Above Average	46.0	49.3	53.1	48.8	45.5
Rest	26.0	17.7	11.0	10.5	9.6
	100.0	100.0	100.0	100.0	100.0

Fifty-five per cent of MSA users at the Castlebellingham MSA rated the overall facilities as *excellent*. In total 17% of users surveyed found the food service to be *average* or *below average*.

Table 17: Distribution of Castlebellingham MSA Users by Views of Quality of MSA Facilities

	Food (%)	Toilet (%)	Car Parking (%)	Amenity Building (%)	Overall Impression (%)
<i>Castlebellingham</i>					
Excellent	36.9	46.7	49.5	48.1	55.1
Above Average	46.3	51.4	45.3	48.6	42.1
Rest	16.8	1.9	5.1	3.3	2.8
	100.0	100.0	100.0	100.0	100.0

Table 18 sets out the overall distribution of MSA users' opinions vis a vis the price competitiveness of the various MSA facilities. As can be seen from the Table, on average, 85 per cent of users *agree* or *strongly agree* with the assertion that the prices of the MSA services are competitive. In total just 2 per cent of users *disagreed strongly* with this assertion.

Table 18: Distribution of All MSA Users by Views of Price Competitiveness of MSAs

	All	M4	Lusk	Castlebellingham
<i>Competitive Prices</i>	%	%	%	%
Agree Strongly	32.2	39.8	33.5	23.4
Agree Slightly	53.6	43.1	53.1	64.5
Disagree Slightly	12.3	15.6	12.0	9.3
Disagree Strongly	1.9	1.4	1.4	2.8
	100.0	100.0	100.0	100.0