Appendix 3 – In-Depth Checks

The following appendix sets out the In-Depth Checks undertaken by the Department for the 2014 Quality Assurance Report. The three projects/programmes selected for review are:

- **Integrated Ticketing Project (Page 104)**
- **City Centre Resignalling Project (Page 130)**
- **N5 Ballaghadereen Bypass (Page 145)**

The In-Depth Checks were conducted by EFEU in line with a specific methodology developed in line with the guidance set out in the Public Spending Code and evaluation experience.

An Roinn Iompair Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

Economic and Financial Evaluation Unit

Quality Assurance – In Depth Check

Section A: Introduction

This introductory section details the headline information on the programme or project in question.

Programme or Project Information	
Name	Integrated Ticketing Scheme
Detail	Investment for technological system to provide for one ticketing system across the major public transport modes in the Greater Dublin Area.
Responsible Body	National Transport Authority/Rail Procurement Agency
Current Status	Expenditure Recently Ended
Start Date	2006
End Date	December 2014
Overall Cost	€54.98 million

Project Description

The Integrated Ticketing Scheme (ITS) was a technological investment programme to bring about a single method of ticketing between the main public transport modes in the Greater Dublin Area (GDA). The project's primary output was the Leap card which has been in operation since the 12th of December 2011. The project had three phases in total. The two major phases were phases 1 and 2.

Phase 1 was launched to the general public initially on the services of Dublin Bus, Luas, Irish Rail DART/Commuter Rail with a "Pay-As-You-Go" electronic purse using reloadable contactless chip cards. Further roll-out of the scheme continued in 2012 on the services of Matthews Bettystown route and with the launch of the Student Travel Card which led to significant growth in Leap Cards issued.

Phase 2 was rolled out in a progressive manner in two distinct ways; firstly geographically with Bus Éireann introducing the Leap card scheme onto all Eastern region services and to some private bus operators operating services within the GDA, or that include routes coming into the GDA.

The other aspect of Phase 2 built on the smart ticketing opportunities including fare capping (daily and weekly), transfer discounting for through journeys, adding time based and journey based products (e.g. Rambler and Taxsaver) to the card and instant auto-top-up.

Phase 3 targets the roll out of the leap card to the 4 regional cities and nationally and extends the scheme to additional commercial bus operators. Other developments under phase 3 include full refresh of Leap back office hardware, improvements to Web processes for Autoload, Taxsaver card replacement and refunding as well as development of significant new technology (Near Field Communications - NFC) to help Leap Card users to simplify their transactions. With NFC, the Leap Card user will be able to use a special, free smartphone App to top-up their Leap Cards immediately via the smartphone App, just by holding the card and the phone close to each other. As

Under consideration in this in-depth check are phases 1 and 2 which essentially cover the original envisaged project – an integrated public transport ticketing service for the GDA. Phase 3 has and is being funded out of the NTA's own discretionary funding rather than specific funding from the Department of Transport, Tourism and Sport. As such the continued roll out of integrated ticketing to areas outside the GDA and to a greater number of private bus operators is outside the scope of this specific review.

In overall terms, the Integrated Ticketing Project posed considerable governance, procurement and technical challenges from the outset. This was to a great extent inevitable in a project involving numerous organisations, and where there were many business and technical complexities, and this has also been the experience internationally. As will be detailed, the delivery of the project was complex and underwent a number of delays and budgetary changes. However as of the date of this review, the project has been successfully delivered with many additional features added to improve functionality and extend the Leap card offering for customers. This has all been achieved within the final approved budget of €55.4m.

Section B - Step 1: Logic Model Mapping

As part of this In-Depth Check, EFEU have completed a Logic Model for the Integrated Ticketing Project. A Programme Logic Model is a standard evaluation tool and is utilised here as a means of distilling information. Further information is available in the Public Spending Code.

Objectives	Inputs	Activities	Outputs	Outcomes
Provide Single Ticketing System for Major Public Transport Modes in the GDA To have 250,000 Smart cards in Operation Improve the Level of Service for Public Transport Users by Offering Inter-Modal Transfer Opportunities Increase the Number of Passenger Journeys on Public Transport in the GDA	€54.98 million of Capital Expenditure Associated Staff Costs (To be Estimated if Full Evaluation Being Carried Out)	Construction of Back Office System to Handle Operation Roll Out of Card Readers at Public Transport Stations and Vehicles Development and Supply of Common Smart Card Marketing Campaign to Stimulate Product Use System Enhancements to Facilitate Other Products	A Single Ticketing System for Major Public Transport Modes in the GDA.	A Number of Leap Cards in Operation and Proportion of PT Trips Used With It An Improved Level of Service for Public Transport Users A Higher Number of Passenger Journeys on Public Transport in the GDA

Description of Logic Model

Objectives: There were a number of objectives for the Integrated Ticketing Project. Firstly, the project aimed to deliver a single ticketing system for use on all major public transport modes in Dublin. This involved the roll out of the system to bus, rail and light rail operators in the GDA. The second objective was a target of having 250,000 smartcards in operation. The third and fourth objectives are directly related to the achievement of the first two – to improve the level of service for public transport users by providing an easy to use integrated ticketing solution and to increase the number of public transport journeys as a result of the system improvement.

Inputs: The primary input to the programme was the capital funding of €54.98 million which was provided from the Department of Transport, Tourism and Sport to the National Transport Authority. The other input to the programme was the associated staff costs involved with programme oversight at the NTA and DTTaS. These costs are currently not quantified but should be assessed as part of any future full evaluation.

Activities: There were a number of key activities carried out through the project. First, the construction of technological infrastructure to handle the operation of the system was a primary activity. Second, the roll out of the physical cards and card readers to customers and PT operators to provide the necessary physical infrastructure for the project. Third, a marketing campaign was employed to raise brand awareness for, and encourage use of, the system. Finally, system enhancement work to ensure that other products and services could be handled sufficiently. The completion of these activities made up the implementation of the integrated ticketing programme.

Outputs: Having carried out the identified activities using the inputs, the primary output of the programme was the introduction and operation of the Leap card system.

Outcomes: The envisaged outcomes of the programme are for a certain number of leap cards to be in operation, an increased level of service for public transport users and, as a result, an increased number of public transport journeys within the GDA.

Section B - Step 2: Summary Timeline of Project/Programme

The following section tracks the Integrated Ticketing Scheme from inception to conclusion in terms of major project/programme milestones. Below highlights the period when the RPA managed the project in light green and when the NTA did in dark green.

2001	Dublin Transportation Office published strategy for GDA 2000-2016 which recommended integrated ticketing.
2002	Economic evaluation of the project which appraised numerous project scheme types.
Late 2002	ITS Project initiated by mandate from the then Minister for Transport to the RPA.
2003	RPA established an in-house project team who procured the services of design contractors.
2004	Departments of Finance/Transport approve budget of €29.6 million for ITS project.
2004/2005	RPA sought to procure suppliers and suitable supplier not secured for services. Department of Transport initiated external review of process which confirmed design and approach in line with best practice. Recommended governance of project be expanded to key stakeholders.
2006	Integrated Ticketing Project Board (ITPB) established by the Minister for Transport consisting of the key stakeholders to oversee the implementation of the project.
2007	Updated economic appraisal and ITPB agreed final scope of the project. Departments of Finance/Transport approve budget of €49.6 million and MOU signed by all parties.
2008	Following tendering process a higher budget requirement was identified. Departments of Finance/Transport approve final budget of €55.35 million for the programme.
September 2010	Statutory responsibility of the scheme passed to the NTA.
December 2011	Completion of Phase 1 of scheme and public launch.
January 2012	NTA assumed control of operation of scheme.
December 2014	Completion of Phase 2 of the Integrated Ticketing scheme.
On-going	NTA roll-out of Phase 3 of project.

Section B - Step 3: Analysis of Key Documents

The following section reviews the key documentation relating to appraisal, analysis and evaluation for the Integrated Ticketing Project.

Project/Programme Key Documents	
Title	**Details**
Outline Business Case (2004)	An Ex-Ante Appraisal of the Integrated Ticketing System
Updated Outline Business Case (2007)	An Updated Ex-Ante Appraisal of the Integrated Ticketing System
On-going Project Reporting and Updated Sanction (2006-2011)	Numerous Reports to the Department of Transport/Finance and Reports of the Project Board.
Project Close Out Report (2015)	A Close Out Report for the Project at the Completion of the Integrated Ticketing System

Key Document 1: Outline Business Case (2004)

The RPA produced an Outline Business Case (OBC) for the initially envisaged project in 2002. This OBC set out a financial appraisal of 10 different options for the project and then produced a detailed Cost Benefit Analysis (CBA) for the preferred options.

The 10 options which were assessed as part of the business plan were based on various combinations of factors such as variety of entry and exit scenarios for modes of transport, geographical extension beyond Dublin, non-smart card use for integrated ticketing, integration with Northern Ireland and a do-nothing case (base case). These 10 scenarios were arrived at following a detailed workshop with relevant stakeholders. A business case model was constructed to analyse the options in line with a methodology utilised by the Department for Transport in the UK. The model consisted of comparing capital and operating costs to benefits which were anticipated to accrue from factors including bus operating time savings, cash float interest, reduction in fare evasion, increased positive image, value of data generated, transaction charges and marketing return. These results were tested with a risk model to analyse the likelihood of achieving the resultant financial analyses which yielded 4 project options with positive NPVs of €5, €9, €14 and €96 million.

The 4 chosen project options were then subjected to a full cost-benefit analysis. The CBA analysis included further quantified benefits on the time savings for public transport users, the decongestion benefits from increased public transport use, the saving on private vehicle operating costs, increased fare revenue, decreased levels of fraud and increased setup costs arising from the provision of concessionary smart cards. The completed analysis yielded NPVs of €10, €16, €19.5 and €107 million for the four project options. The chosen preferred option was the scenario which gave an NPV of €19.5 million as it was assumed that the project yielding €107 million would not be feasible due to other considerations regarding a significant downsizing of the bus fleet. The chosen scenario was based on the rail and Luas networks being fixed with entry and exit validators (automatic fare calculation) and the bus network being fitted with passenger self-selection validators. The cited cost of the project was €29.5 million. The CBA also included a short Multi-Criteria Analysis (MCA) to analyse the effect on other areas such as the environment, safety, the economy, accessibility and social exclusion.

The completion of the financial analysis and cost-benefit analysis made a number of methodological choices and assumptions.

- Both analyses were carried out over a 10 year time horizon which was cited as being the appropriate length for the typical equipment life/obsolescence of the infrastructure.
- A discount rate of 5% was applied and this was in line with those used at the time[1].
- The CBA did not to apply a Shadow Price of Public Funds of 150% as recommended by guidelines at the time[2].
- The methodology used to calculate the decongestion benefits is not fully justified. Essentially, the appraisal assumes that the decongestion benefits of the project will be the same as those in Central London, based on a unit benefit per passenger car unit per kilometre. A stronger rationale as to why this would be the case should have been provided.

[1] CSF Evaluation Unit, Proposed Working Rules for Cost Benefit Analysis, June 1999

[2] The CSF evaluation guidelines referred to above state that a shadow price of public funds of 150% should be applied in order to take account of the distortionary effects of taxation. The CBA notes this and states that this rule is not followed due to the fungibility of money rendering the distinction between different sources somewhat meaningless at the margins.

- Some sensitivity tests were carried out in the appraisal. However, these revealed that the benefits of the project were subject to the assumption that the free road space created by a shift from car use to public transport use would not then be utilised by other demand. While the sensitivity does show that the project still has positive benefits when up to 95% of the created road space is re-utilised, the NPV falls from €19.5m to €0.23m.
- The CBA's benefits rely on the assumption that the project will deliver a 2% increase in revenue due to increased public transport use and image and a 1% decrease in fraud levels. The rationale for these assumptions was not fully detailed and no sensitivity analysis was carried out to assess robustness.

The original business case completed for this project in 2002 is thus seen as broadly compliant with the specified guidelines and rules in place at the time. However, a number of potential deficiencies are cited here including the non-use of a shadow price of public funds, the methodology for calculating decongestion benefits and the assumptions made around the project's benefits coupled with the lack of sensitivity analysis.

Key Document 2: Updated Outline Business Case (2007)

The RPA produced an updated OBC in 2007 as a result of delays to project implementation. This OBC was the appraisal upon which the current project was based. The CBA contained within the business case was carried out on one project option only which was similar to that shown as being the preferred option in the 2002 study. The resultant NPV for the project was €10.2 million.

The CBA outlined the discounted NPV over a 10 year period based on potential costs and benefits. Of particular note is the increased cost estimate from the 2002 OBC which saw a rise from €29.5 to €49.6 million. The OBC cites a number of reasons for this including extension of the roll out of the programme, increased scope of project delivery and inflation. The primary reason for the cost increase appears to be the fact that the initial budget was insufficient to allow for procurement to succeed and thus a larger, and more realistic, budget was required. It is important to note that the final agreed budget was increased to €55.35 million. This will be discussed further below.

The CBA derives its benefits from 3 sources. First, revenue is assumed to increase by 1% due to reduced fraud. Second, it is assumed that passenger numbers will increase by 1%. Finally, it is assumed that there will be a 0.5% decrease in the cost of sales. A number of other unquantifiable benefits are also mentioned including safety environmental and accessibility benefits. The quantification of benefits thus relies on the assumptions made above and the forecasted demand trend for public transport use in Dublin.

A number of concerns emerge with the analysis that was carried out. Firstly, the use of the assumptions listed above are not backed up with detailed rationale. The 1% growth in PT users is justified with experience from the use of smart cards on the Luas and the 0.5% reduction in the cost of sales is not justified but is stated as being conservative. Evidence is cited from reports from other schemes in Hong Kong, London and Belfast on the 1% reduction in fraud but this is not detailed for sufficient justification. There is no sensitivity analysis carried out on these assumptions.

Secondly, and most importantly, the forecasted growth in both population and public transport growth could be viewed as being optimistic. The forecasts were carried out using the RPA's transport model at the time. The analysis included a number of projects that were subsequently not completed such as Metro North, Metro West and elements of the Luas network and given the economic crash in 2008, and the affect this had on PT use and travel demand, it is not overly relevant to simply compare forecasted growth to actual outturns. However, the following can be noted.

- The forecast annual growth for rail passengers in the GDA between 2004 and 2016 was expected to be over 13% with 2% subsequently.
- Bus use was forecast to increase by 5.4% per annum
- Luas passenger numbers were forecast to increase by 12% per annum on average as the full network was constructed.
- Metro passenger number were forecasted to increase by 26% per annum on average following construction of Metro North in 2013 and Metro West in 2015.

Despite the unforeseen negative wider economic trends and non-completion of a number of envisaged transport projects, these projections may be seen as optimistic and most importantly no sensitivity analysis is conducted to assess the impact of higher or lower

outturns. These forecasts were predicated on a selection of population growth scenario which is assumed 2% annual growth between 2002 and 2016. This is cited in the business case as being above the forecasts outlined in the Regional Planning Guidelines (RPGs) which were between 1.1% and 1.7% annually.

Key Document 3: On-Going Project Reporting and Updated Sanction Process

Throughout the completion of the project there were numerous reports and summary records available tracking the development of the process. Specifically, there were over 65 meeting reports from the Integrated Ticketing Project Board and 15 progress reports to the Minister of Transport. In general, the reports are clear and set out the progress of the project adequately. The reports provided up to date timelines towards project completion and budget developments. In tandem with the other key documentation they provide an overview of how the process developed. Of particular importance within the reports is the agreed Memorandum of Understanding (MoU) between the Department of Transport, the Railway Procurement Agency and the public transport operators. The MoU was entered in Q1 2008 and set out the agreement upon which the project was to be delivered. In general the MoU sets out a principled approach which is in line with achieving best value for money from the project. However, within the MoU, DTTaS commits to a budget with an upper limit of €49.6 million. Following the MoU and the aforementioned business case, sanction was given for this level of expenditure by the Department of Finance.

Following a renewed tendering process, the project management team identified that the agreed budget was insufficient to fully deliver the project. As such, they submitted a proposal for revised sanction of an increased budget of €55.4 million based on the updated known funding requirements. In the Department of Finance guidelines at that time it states that where significant budgetary changes occur a reappraisal may be necessary. Within the aforementioned MoU, it states that any increase in cost or decrease in anticipated benefits will necessitate a reappraisal. Within the memo submitted for budget approval it notes that an update of the business case was undertaken including the proposed increased cost and that the NPV was still positive. In fact the NPV cited was even higher than the business case as it used a discount rate of 4% rather than 5% given the revised Department of Finance guidelines at the time. Thus, in line with guidelines at the time a revised business case was carried out and submitted once the costs increased from the original basis. However, the

issues raised in relation to the methodology for the updated business case in 2007 apply also to this updated analysis given the fact that it relied on the same assumptions and methodological choices.

The Department of Finance then sanctioned the increased budget with a number of conditions including that the budget didn't exceed €55.4 million, the Department continued to deliver the project in adherence with the Department of Finance's guidelines and the capital costs were met from the existing Transport 21 budget.

Key Document 4: Project Close Out Report (2015)

As part of the final stages of the management of the integrated ticketing project, a Close Out Report was completed. The report states that a full Post-Project Review will be carried out later on in 2015. The report sets out the summary details of project implementation and a comparison between envisaged costs/benefits and outturns. The report also compares the final project to the original scope. On the budget, the report states that the final outturn was €54.97 million which is within the approved budget level of €55.35 million. It states that the variance of less than 1% is within acceptable tolerance for such a complex project. While confirming that the project was completed within the final agreed budget, the report does not state that the budget was twice increased over the course of the planning stage and the rationale for these budget increases. As outlined previously, the original economic appraisal in 2002 envisaged a total programme cost of €29.5 million and the updated business case in 2007 listed a total cost of €49.6 million due to inflation costs related to longer project implementation and increased payments to operators to stimulate private involvement. In 2008, ITPB sought approval for a €5.8 million increase to €55.35 million overall due to higher than envisaged costs for the build contract.

On the scope, the report details a number of changes and developments that occurred between the start and end of the project. These included positive developments such as the roll out to all GDA Bus Éireann services rather than a single corridor pilot, the unenvisaged incorporation of the student travel card scheme and a vast increase in the number of cards issued. The report also notes that a number of other developments such as the complete full roll out to private bus operators and providing for direct Leap sales at ticketing booths within rail and bus stations have not materialised.

On the outturn for the project's benefits, the report compares the three main anticipated benefits to observed trends. Firstly, the report states that the objective of achieving 1% extra public transport trips was achieved at 1.4%. It justifies this by relying on survey answers as to how integrated ticketing has affected mode choice and grossing up the results based on the number of leap card users. Two issues arise here. Firstly, it is not possible within this in-depth check to assess the validity and methodology of the survey work referred to. Secondly, overall public transport use[3] on the 4 main modes has decreased by 17% between 2007 and 2014. Thus, in the context of overall declines in PT use, it is even more difficult to arrive at an assessment over whether the scheme achieved its objective and realised the stated benefits. As the report notes, it is difficult to assess the precise impact of the Leap card in this regard, however the report could have been strengthened through the use of sensitivity testing of the methodology.

Second, the business case assumed a 1% decrease in the level of fraud. The Close Out Report notes that this is very difficult to quantify and that a reduction of greater than 1% is likely. Third, the business case anticipated a 0.5% increase in revenue due to the reduced cost of sales. An analysis of outturn use and cost data listed in the Close Out Report showed that a 0.9% reduction in the cost of sales have been achieved. However, whether this equates to a 0.5% increase in revenue is unclear and not stated.

[3] Transport Trends 2015, Department of Transport, Tourism and Sport. Refers

Section B - Step 4: Data Audit

The following section details the data audit that was carried out for the Integrated Ticketing Project. It evaluates whether appropriate data is available for the future evaluation of the project/programme.

Key Data Required	Use	Availability
Overall Level of Project Expenditure	Measure Programme Inputs	Available from Project Reports.
Number of Leap Cards in Operation	Assess Take Up of Scheme	Available
Number of Passenger Journeys on PT Modes	Assess Achievement of Benefits	Available
Modal Share of PT Modes	Assess Achievement of Benefits	Available
Level of Fare Evasion/Fraud	Assess Achievement of Benefits	Estimation Possible
Cost of Sales	Assess Achievement of Benefits	Estimation Likely Possible
Survey on Customer Service Enhancement	Assess Wider Benefits	Possible, Subject to Cost
Savings on Survey Data	Assess Wider Benefits	Estimation Possible
Level of Decongestion as a Result of Increased PT Use	Assess Wider Benefits	Possibly Available Through NTA GDA Model

Data Availability and Proposed Next Steps

As is noted throughout the initial appraisal of the project and the close out report, quantifying the precise effect of the programme in terms of achieving its objectives and garnering benefits is a difficult task. Specifically, assessing the programme's ability to increase the number of public transport users is difficult. Given the constraints involved, it is envisaged that the availability of the data listed above would provide the greatest opportunity for evaluation to take place. As part of DTTaS's on-going compliance with the Public Spending Code, a number of projects and programmes are selected to undergo a Focused Policy Assessment (FPA) of Value for Money Review (VfM) over a three year cycle. Thus, this project may, at some point in the future, be subject to more detailed analysis. As such the data audit presented above details the type of information that would be ideally available.

Does the delivery of the project/programme comply with the standards set out in the Public Spending Code?

This in-depth check has shown that the primary tenants of the prevailing guidance at the time, and thus the ethos of the Public Spending Code, were adhered to throughout the delivery of the Integrated Ticketing Project. A number of options were appraised before the optimum option was further analysed. The objectives of the programme were explicitly detailed at the start of the process. A Memorandum of Understanding was arrived at between the RPA, DTTaS and the funding of the project was approved subject to this analysis and the programme was fully implemented with a turnout cost which was less than the final agreed budget. In addition, the performance of the scheme in terms of Leap cards in use has far succeeded the level envisaged with 1 million cards sold so far and the majority of the GDA public transport trips using the system.

In overall terms, the Integrated Ticketing Project posed considerable governance, procurement and technical challenges from the outset. This was to a great extent inevitable in a project involving numerous organisations, and where there were many business and technical complexities, and this has also been the experience internationally. Thus, the delivery of the project was managed successfully given the various interrelated external factors.

This review found a number of areas where potential issues emerged. Potential improvements will be detailed below such that the management and delivery of future projects is improved.

- The robustness of the methodology employed in the original and updated economic appraisal of the project could be strengthened with potentially optimistic forecasts, little sensitivity testing and insufficiently justified methodological choices.
- A time delay equating to 6 years to operation and 9 years to project completion based on initial planning and 1 year to operation and 4 years to completion based on the updated planning. The original business case stated that the scheme would be operational by 2005. However, the project was delayed as services could not be procured at that level of funding. The updated business case stated that the scheme

would be fully operational by mid to late 2010. The scheme was opened to the public in December 2011 and completed in December 2014. It is worth noting that the natural complexity of the project was a key driver of the overall delay.

- A higher budget than initially proposed. The original business case envisaged a total programme cost of €29.5 million and the updated business case in 2007 listed a total cost of €49.6 million and the final approved budget was €55.35 million. Both increases were sanctioned by the Department of Finance and reappraisal took place.

Overall, it is the view of the EFEU that the project, in general, complied with the prevailing guidance at the time, and thus the overall ethos and provisions of the Public Spending Code. At appraisal stage, a number of project options were subject to comparative economic appraisal and the preferred option was subject to more detailed appraisal. At implementation stage, the responsible body adequately informed the then Minister of Transport of progress with regards to budget and management developments. At post-implementation stage a Close Out Report was completed and a Post-Project Review is in the process of being carried out.

Is the necessary data and information available such that the project/programme can be subjected to a full evaluation at a later date?

Quantifying the precise impact of the programme is a difficult task regardless of data availability. Specifically, assessing the impact on public transport use is particularly difficult. However, this report has identified the data requirements that would enable a best case evaluation given the constraints that exist. The majority of the data is available or can be estimated. The possibility of the project being chosen for further detailed evaluation is the rationale for identifying the level of data availability currently. This should be considered by the NTA and where gaps can be filled at low cost, this should be done.

What improvements are recommended such that future processes and management is enhanced?

Given the findings outlined throughout the review the following recommendations are made for implementation by the relevant bodies:

- The appraisal of all major investment should continue to be done in line with central guidance i.e. the provisions of both the Public Spending Code (PSC) and the

forthcoming DTTaS Common Appraisal Framework (CAF). As such there should be consultation on assumptions and methodology utilised in appraisal between the NTA and DTTaS's EFEU.

- The NTA internal guidelines for the management of its capital programme should be updated at an appropriate time to incorporate the provisions of both the Public Spending Code and the forthcoming Common Appraisal Framework.
- As a general rule, best practice appraisal should be targeted such that methodological assumptions and choices are fully justified and substantial sensitivity tests are provided, particularly in cases where benefits are harder to directly quantify.
- As demonstrated through this in-depth check, in cases where significant cost increases or time delays have been identified following the appraisal of a project, there should continue to be consultation with the relevant line division and EFEU to identify whether a reappraisal is necessary, in line with the Public Spending Code. This step was taken in the management of this project and represents best practice.
- The forthcoming Post-Project Review should be cognisant of the primary issues highlighted in this in-depth check. In particular further detail and justification for both time delays and budget overruns should be provided and an updated ex-post comparison of the Cost-Benefit Analysis should be carried out.

Section C: In-Depth Check Summary

The following section presents a summary of the findings of this In-Depth Check on the Integrated Ticketing Project.

Summary of In-Depth Check

The in-depth check of the Integrated Ticketing Project revealed that the relevant central guidance available at the time, and thus the principles and ethos of the Public Spending Code, were broadly adhered to. In particular, the process appraised a number of options and submitted the final chosen option to an in-depth appraisal. The project's management was in line with the ethos of central guidelines and the organisation's guidelines. There was appropriate reporting between the project management board and the Department and Minister of Transport. Furthermore, it is noted that a full post-project review will be carried out. This will further serve to highlight where the project has performed well and also areas which could be strengthened in the roll out of future phases and also in similar projects.

While EFEU are satisfied that the project was managed satisfactorily, a number of areas did emerge which have led to some recommendations for enhancing future practice. The main areas related to small issues with the validity and methodology of the business cases, the significant time delay in completing the project, and the associated increased cost. While the natural complexity of the project to some extent justifies the time delay and cost issues future projects should aim to estimate these elements with greater accuracy at scoping/planning stage. EFEU recommends that all future business cases continue to be conducted in line with central appraisal guidance (i.e. the Public Spending Code (PSC) and the Department of Transport, Tourism and Sport's forthcoming Common Appraisal Framework (CAF)) and in consultation with EFEU. It is also recommended that the NTA's internal project management guidelines are updated at an appropriate time to account for the provisions of the PSC and the forthcoming updated CAF. Best practice appraisal should be targeted in the future such that all methodological assumptions and choices are appropriately justified and tested for sensitivity. Finally, the forthcoming Post-Project Review of the Integrated Ticketing project should be cognisant of the issues raised by this in-depth check.

Appendix: Detailed DTTaS Project Timeline

1994	Dublin Transportation Initiative Report recommends integrated fares and ticketing for public transport in Dublin
1998	Establishment of Integrated Ticketing Committee by then Dept. (comprises Dublin Bus, Irish Rail, Dublin Transportation Office, Light Rail Project Office)
2000 (Nov.)	Report of Integrated Ticketing Committee noted by Government & published. Recommends that fare structure be independent of the technology deployed in addition to rebated fares and smartcard ticketing for the Greater Dublin Area (GDA).
2002 (March)	S.I. 84/2002 empowers the Railway Procurement Agency as the statutory body responsible for delivering an integrated ticketing system.
2002 (Jun.)	Commitment to integrated ticketing and smartcard technologies in Agreed Programme for Government
2002 (Sep.)	Appraisal Report for RPA (MVA Consultants) indicates that there is a viable business case and cost benefit analysis and that integrated ticketing can be delivered within a €29.6m capital envelope
2002 (Oct.)	RPA submit Project Plan to Department, indicating a delivery date of December 2005.
2003 (Jan.)	Department Mandate issued to the RPA envisages a national integrated ticketing scheme following implementation in and around Dublin
2003 (Jul.)	RPA engage contractors, Sequoia to design the integrated ticketing system
2003 (Oct.)	RPA establish Steering Committee comprising Dublin Bus, Bus Eireann, Irish Rail, private operators, Dept. of Social & Family Affairs, Dublin Transportation Office, Dept. and RPA-Luas.
2004	Department of Finance sanction for €29.6m for integrated ticketing.

(Jan.)	
2004 (Apr.)	RPA commence public procurement of a Final Design, Build & Operate contract for integrated ticketing (OJEU Notice placed).
2004 (Apr.)	Private operator, Morton's in conjunction with RPA, launch smartcard scheme as a proof of concept.
2004 (Jun.)	Dublin Bus commence public procurement of a smartcard point of sale system (OJEU Notice placed)
2005 Mar.)	RPA launch Luas smartcard as interim scheme.
2005 (May)	During the tender stage of RPA's public procurement process, 3 of the 5 companies/consortia withdrew without giving any reason for their action. Difficulties arose with remaining 2 tenderers and RPA discontinue public procurement.
2005 (June)	Dublin Bus commence public procurement of disposable smartcards and associated smartcard infrastructure (2 eTenders notices placed)
2005 (Jul.)	Department establishes tri-partite process with RPA & Dublin Bus with a view to reaching agreement. RPA revised delivery strategy is put on hold.
2006 (Apr.)	Independent review of project recommended proceeding with integrated ticketing, but only with enhanced governance arrangements. (MVA Consultants)
2006 (May)	Peer review of project recommended proceeding with integrated ticketing, with enhanced governance arrangements involving a high-level Project Board
2006 (July)	Minister established an Integrated Ticketing Project Board under independent chairman with remit to report back in Sept. with cost, specification and timescale for integrated ticketing. Board to report quarterly to Minister.
2006 (Dec)	The Second Report of the Project Board sets out the timelines, scope and budget for the implementation of the project. Budget estimated at €49.6m, ITS will start

	to be rolled-out in GDA within 27 months of authorisation to proceed (i.e. Sept 2009).
2006 (Dec)	In line with PB's 2nd Report ITS scheme to be rolled in 2 phases: 1. In Sept '09 on Dublin Bus, Luas & Morton's (private bus op) services 2. Within 12 mths roll-out on services of IÉ DART/commuter rail, BÉ pilot & other private bus ops
2007 (May)	It has been agreed that a critical part of the ITS Scheme will be the participation of the Free Travel Scheme by way of the linking of the proposed Public Services Card (PSC) with integrated ticketing. In effect, the PSC will act as the integrated ticketing smart card for the purposes of DSFA's Free Travel Scheme.
2007 (May)	Dept of Finance conveys sanction for revised budget of €49.6m for the project based on Project Board's recommendations.
2007 (June)	Project Board commenced EU public procurement process to seek a supplier to build the Back Office which is a central part of the smartcard system.
2007 Oct)	An MOU setting out roles, responsibilities, actions & commitments of each of the participants is agreed by Project Board. The MOU is signed by all parties to the Project.
2008 (Feb)	5 tenders received in respect of back office contract. All are in excess of Project Board's estimate of €7.1m (tenders range from €8.3m to €19.5m). Following evaluation the lowest of these is not most economically advantageous. Project Director advises that an increase in budget is required to facilitate contract price.
2008 (Feb)	The protracted and difficult nature of the contract negotiations with IBM has caused a delay in the ITS programme with a knock-on effect on transport operators' integration work and release of ITS operate contractor tender documentation.
2008 (May)	As a result of final contract price being substantially higher than anticipated Project Board sought a revised budget of €55.4m which included a re-assessed

	contingency provision.
2008 (July)	Dept of Finance approves increased budgetary sanction of €55.4m on 25 July 2008 subject to capital costs of project (including agreed contributions to stakeholders & cost of incorporating Free Travel Scheme) not exceeding €55.4m.
2008 (July)	EU public procurement process for appointment of a contractor to operate system commences. As well as operating the system, operator will be responsible for retail Point of Sale network, provision of helpdesk and supply of smartcards.
2008 (July)	All buses in Dublin Bus fleet are fitted with smartcard validators which are now in use on buses in respect of a number of ticketing products.
2008 (Sept)	IBM & their sub-contractor MSI Global Systems awarded contract to build Back Office & associated systems on 1st September 2008 (6 mths later than anticipated).
2009 (Feb)	Difficulties have arisen with first phase of the IBM contract "Solution Confirmation" – scheduled for completion before the end Nov 2008. The knock-on effect of this delay is likely to impact the overall programme. To resolve the situation, the issue was escalated through the steps of the dispute resolution procedure in the contract to Chief Executive level.
2009 (Feb)	Agreement was reached and Solution Confirmation has now been completed allowing the next phase, software development, to commence immediately. The project is now firmly in the implementation phase.
2009 (July)	Irish Rail introduce its own interim smart card for its Dart and Dublin commuter services. This interim scheme, together with the Dublin Bus and Luas smart card schemes, will migrate to the single smart card scheme after its launch.
2009 (Dec)	NTA established. Gerry Murphy, CEO, appointed as the Department's representative on the Project Board in place of A/Sec Andy Cullen following his retirement.
2009	The ITS project has moved into the final and most critical phase of delivery, that

(Dec)	of testing. Intensive testing of all aspects of the system was the critical activity during 2009 including testing of Dublin Bus and Luas equipment and systems to ensure the integration of their ticketing systems into ITS, results in a defect-free outcome for cardholders.
2009 (Dec)	IBM delivered Release 1 of the back office which was successfully tested by the project team in the RPA in December 2009.
2010 (Jan)	Pending the formal transfer of responsibility for the integrated ticketing scheme to the NTA current governance arrangements (i.e. Project Board) have continued
2010 (Apr)	RPA awarded the contract to operate the ITS to Hewlett-Packard Ireland (HP).
2010	Intensive pilot testing by a limited number of staff and customers is currently underway of an integrated smartcard for the Dublin Bus/Luas Annual Pass.
2010 (July)	• A number of Dublin Bus and Luas annual pass-holders will be invited to participate in a customer pilot from late summer. • This will be followed later in the year by similar testing for ePurse users of Dublin Bus and Luas services facilitating cashless travel on services of participating ops.
2010 (Sept)	Legal responsibility for ITS formally transferred to NTA. CEO of NTA advises Minister that the NTA is no longer necessarily bound by the decisions of Project Board.
2010 (Oct)	Work is continuing on tackling the technical issues related to the Smart Card Interface Module (SCIM) software in order to optimise the speed at which ticket machines will read the ITS smartcard.
2010 (Nov)	Some technical problems have been detected during testing which need to be resolved before the scheme can progress to the next milestone of customer piloting. Technical teams from RPA, Dublin Bus, Luas and the equipment suppliers are all involved in finding solutions.

2010 (Dec)	Phase zero testing (annual passes on Bus and Luas) now completed.
2011 (Apr)	The target date for full public launch remains late August 2011 for Luas and Dublin Bus. NTA advises that Iarnród Éireann has also made good progress recently and if their programme can be advanced into September the scheme is considering a wider launch on Bus, Luas and Iarnród Éireann at this point.
2011 (May)	Phase one testing focussing purely on the use of ePurse (pay-as-you-go) commences. The roll-out will be extended to all vehicles and then card volumes will be increased until there is sufficient confidence to commence the ramp up to full public launch of the ITS ePurse.
2011 (June)	The public launch date is difficult to anticipate accurately to the day given the scale of testing to be completed and the potential for remedial work to address critical defects.
2011 (Oct)	The mandate given to the ITS Project Board in November 2006 will be fully executed when the systems required to deliver the Scheme are in place so the NTA has agreed with the Board that it will stand down at the end of 2011.
2011 (Dec)	The Leap Card is launched for general public use on 12th December on Bus, Luas, Dart and Rail services. Public transport users will be able to purchase and top up their Leap Card at more than 350 authorised Leap Card agents (Payzone) across Dublin and online at www.leapcard.ie
2012 (Jan)	Project team activity is now moving to Phase 2 of the Scheme which will involve a progressive release of functionality and expansion to additional operators.
2012 (Jan)	Actual expenditure to the end of January 2012 of €49.5 million is in line with the anticipated expenditure profile. The overall budget of €55.4 million is considered adequate to complete the project as currently scoped.
2013 (May)	The provision of PSCs with free travel entitlements by the Department of Social Protection (DSP) will commence in 2013. DSP has provided a programme showing prototype PSCs with free travel enabled will be available to the

	Authority's test team in May 2013.
2013	Private Bus Operators (CBOs) Swords Express and Wexford Bus are fully integrated into the scheme – more CBOs to follow.
2013	Autoload: A pilot project to enable cardholders sign-up for direct reloading of value onto Leap cards from their bank accounts was introduced in 2013 and will be opened up to all in 2014.
2013 (Nov)	Bus Éireann roll-out of Leap across its eastern region services is complete.
2013 (Nov)	Taxsaver Annual Passes on personalised Leap cards in use on DB, Luas IÉ & BÉ services.
2013 (Dec)	Fare capping was successfully introduced across the Luas network in December. This will be extended to other operators in 2014.
2013 (Dec)	By end-2013 399k leap cards were sold and 33.6m journeys taken using Leap.
2014 (Apr)	By end-May 550,000 Leap cards sold and 52m journeys taken using Leap card.
2014 (May)	The joint programme with DSP for integration with the free travel (FT) variant of the Public Services Card (PSC) has been completed. The Leap infrastructure upgrade to enable it to read the PSC free travel (FT) variant will be rolled out in Q4 this year. DSP has issued 184,000 free Travel Public Services Cards to date.
2014 (Mar)	Expenditure of €54.7 million has been incurred on ITS phases 1 & 2 project to the end of March 2014. The capital programme for phase 1 and 2 is drawing to a close and will be largely completed mid-2014 within the €55.4m budget. Expenditure on phase 3 including the expansion of Leap to Cork was €113k, €269k year to date.

2014 (June)	Launch of a Tourist Leap card on Thursday 19 June. It will cost €19.50 for a 3-day ticket (for consecutive days). There will not be a refund for unused credit.
2014 (Aug)	Fares: Simplified/Cheaper fares will be introduced in Aug 2014 for 16, 17 & 18 year olds. Child Leap Card Fares to apply from ages 4 to 18 inclusive. Free public transport for children up to fourth birthday.
2014 (Sept)	Launch of Leap in Galway City on BÉ & City Direct services.
2014 (Oct)	Launch of Leap in Limerick City on BÉ services.
2015 (Feb)	Award of contract to ViX to develop new features which will be launched by NTA to customers over the coming year using Near Field Communications (NFC),
2015 (Feb)	Extension of "Leap 90 Discount" feature to give a €1 discount to Leap Card users transferring between Dublin Bus, Luas, and DART/Commuter Rail within 90 minutes of the start of the first journey. Third and subsequent legs, too, will be discounted by a further €1, if they start within 90 minutes of the start of the preceding legs.
2015 (Apr)	Leap cards sold since launch passes 1 million mark – 60% of public transport journeys now paid for using Leap.
2015 (May)	Integration of Leap with Free Travel Scheme: The Leap infrastructure having been modified to read Public Services Cards being issued by the Dept of Social Protection (DSP) for those entitled to free travel, the rollout of support for the usage of DSP Free Travel passes was completed during May.

An Roinn Iompair Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

Economic and Financial Evaluation Unit

Quality Assurance – In Depth Check

Section A: Introduction

This introductory section details the headline information on the programme or project in question.

Programme or Project Information	
Name	City Centre Resignalling Project
Detail	Capital investment programme to renew and upgrade infrastructure on the main heavy rail lines in Dublin City Centre with the objective of improving capacity and speeds
Responsible Body	National Transport Authority
Current Status	Expenditure Being Incurred
Start Date	First Formal Proposal in 2005
End Date	Currently in Construction (Certain Phases)
Overall Cost	€123.7 million (Incl. VAT)

Project Description

The primary focus of the City Centre Resignalling Project is the replacement of equipment which is becoming life-expired and for which maintenance is becoming increasingly costly. This rising cost results from the increasing difficulty in sourcing spare parts and expertise for an aged system, in an industry where relay interlocking is becoming rare. There are currently 4 phases to the project. Phases 1 and 2 of the project cover the areas between Malahide/Howth, Howth Junction and Killester, and include a turnback facility at the new Clongriffen Station. Phase 3 covers the area from Tara Street to Sandymount while Phase 4 covers the Connolly area. The Dublin City Centre Resignalling Project is a central element of current work to upgrade commuter rail services for the Greater Dublin Area.

The project is currently being delivered on a phased approach and includes the following key elements:

- Replace the existing relay based signalling system at Howth, Howth Junction, Killester, Connolly and Pearse with modern Solid State Electronic Interlocking (SSI).
- Replace the existing life-expired wayside signalling equipment (signals and track circuits) and commission additional signals.
- Complete the associated permanent way alterations including turn-back facilities at Clongriffin (Grange Road) and Grand Canal Dock.

An essential component of project delivery is the fact that it is linked to another key infrastructural proposal, namely Dart Underground. As such, the project was initially proposed in 2005 and appraisal was carried out in 2008 based on the Dart Underground project being completed and significantly higher levels of rail throughput. Phase 1 was given the go ahead and was allocated €49.8 million in October 2008. Given changed economic circumstances, the Dart Underground project was deferred with no target delivery date currently. Given this development an updated appraisal was carried out to assess the merits of the project in the absence of Dart Underground. The project currently being forwarded amounts to Phases 3 and 4 listed above. This in-depth check will assess the processes and management behind all phases of the project to date but will primarily focus on the initial appraisal stage.

Section B - Step 1: Logic Model Mapping

As part of this In-Depth Check, EFEU have completed a Logic Model for the Resignalling Project. A Programme Logic Model is a standard evaluation tool and is utilised here as a means of distilling information. Further information is available in the Public Spending Code.

Objectives	Inputs	Activities	Outputs	Outcomes
Maximise Economic Benefit to Railway Users through Provision of Enhanced Services Protect the Environment through Emission Reductions Due to Reduced Car Use Improve Accessibility and Social Inclusion around GDA Support Integration by Facilitating Other Projects such as DART Underground Ensure the Delivery of High Levels of Safety on Heavy Rail Services	€123.7 Million Expenditure Associated Staff Costs (To be Estimated if Full Evaluation Being Carried Out)	Planning and Development of Project Scope Preparatory Works Construction and Installation of Infrastructure Operation and Maintenance of Infrastructure	A Modern Heavy Rail Signalling Infrastructure in Dublin City Centre	Improved Rail Journey Times and Capacity Reduced Maintenance and Operation Costs Increased Passenger Numbers and Satisfaction on Heavy Rail in the City Centre Maintain Safety Levels in the Future Decreased Emissions through Switch from Car Use

Description of Logic Model

Objectives: The objectives of the City Centre Resignalling Project were set out under 5 headings: economy, environment, accessibility and social inclusion, integration and safety. Firstly, the project aimed to increase the economic benefits to railway users through enhanced services (journey times, capacity etc.), support the financial position of Iarnród Éireann through increased fare revenue and reduce level of road congestion through shift from car use. On the environmental side, the project aimed to reduce emissions through decreased car use and reduce the rate of energy consumption per passenger in the railway system. The project also aimed to enhance accessibility and social inclusion in the Greater Dublin Area. On integration, the project aimed to facilitate the future availability of the railway system through improvements in the reliability of infrastructure and support the eventual delivery of DART underground. Finally, the project also aimed to ensure the continued delivery of the highest safety standards in the provision of rail services.

Inputs: The primary input to the programme is the capital funding of €123.7 million which represents the funding requirement to deliver all phases of the project. In addition to this input, there are associated staff costs in DTTaS, the NTA and Irish Rail.

Activities: There are a number of activities involved in the delivery of the project. First, a significant amount of planning is involved in design and operations before the project can begin to be implemented. Second, preparatory works need to be carried out to make implementation possible. Third, at an appropriate stage the project can be implemented and constructed based on the work entailed in the previous steps. Finally, once constructed the project requires on-going maintenance and operation.

Outputs: Having carried out the identified activities using the inputs, the output of the project is for a modern Heavy Rail Signalling Infrastructure in Dublin City Centre.

Outcomes: The envisaged outcomes of the project flow directly from the project's objectives. As such the outcomes are centred on improved rail journey times and capacity, reduced maintenance and operation costs, increased passenger numbers and satisfaction on heavy rail in the city centre, maintenance of safety levels in the future and decreased emissions through switch from car use.

Section B - Step 2: Summary Timeline of Project/Programme

The following section tracks the City Centre Resignalling Project from inception to current status in terms of major project/programme milestones

2001	Dublin Transport Office report recommends Resignalling within the city centre to allow for substantial increase of trains at peak hours.
2004	CCRP recommended in Greater Dublin Integrated Rail Network business case,
2005	Transport 21 approved by Government and included provisions for CCRP in tandem with Dart Underground
2005	Board of Iarnród Éireann and Department of Transport approve funding of €2 million for preparatory and enabling works.
February 2008	Funding of €7.5 million approved by Department of Transport to progress design, procurement and enabling works.
March 2008	Business Case for the project submitted in line with DTTaS appraisal guidelines with full cost listed at €123.7 million. This was audited on behalf of the Department by Goodbody Economic Consultants.
October 2008	Board of Iarnród Éireann and Department of Transport approved budget of €49.8 million to deliver Phase 1 of the project (between Malahide/Howth and Killester, including a turn-back facility at Clongriffin).
2008-2012	Project delayed due to changed economic circumstances and postponement of Dart Underground.
2012	Revised delivery strategy submitted splitting Phase 1 in to two parts – the northern section and the section required to facilitate Dart Underground.
2012	Revised Business Case submitted to assess the viability of the whole project in the absence of Dart Underground.
October 2013	Phase 1 commissioned.
March 2014	Implementation Plan initiated for Phases 3 and 4 with Phase 3 proceeding to construction and Phase 4 being deferred until resources become available.

Section B - Step 3: Analysis of Key Documents

The following section reviews the key documentation relating to appraisal, analysis and evaluation for the City Centre Resignalling Project.

Project/Programme Key Documents	
Title	**Details**
Original Business Case (2008)	An Ex-Ante Appraisal of the City Centre Resignalling Project in March 2008
Updated Business Case (2012)	An Updated Appraisal of the City Centre Resignalling Project
On-Going Project Reporting	On-Going Project Reports and Correspondence for the City Centre Resignalling Project

Key Document 1: Original Business Case (2008)

In March 2008 a Business Case was completed by Iarnród Éireann for the City Centre Resignalling project. The economic appraisal consisted of the full project (i.e. inclusive of all phases) and lists a total cost for the infrastructural costs at €123.7 million. Furthermore, the appraisal lists a full project cost of €290 million once the acquisition of rolling stock units to deliver the extra demand is accounted for. Based on the full project cost of €290 million, the appraisal lists a Net Present Value (NPV) of €292 million, a Benefit to Cost ratio (BCR) of 1.61 and an Internal Rate of Return (IRR) of 9.1%.

The Business Case explicitly states that it is undertaken in line with the Department of Finance and Department of Transport appraisal guidelines at the time. The appraisal featured the following methodology:

- A 30 year appraisal period from commencement of services in 2012
- Discount rate of 4% applied (in line with DoF guidelines)
- No shadow prices were used (in line with DoF guidelines)
- Do-minimum and do-project scenarios were appraised

The project's appraisal garnered its benefits from a number of sources including decongestion benefits, time savings, fuel and emission savings, accident savings and noise

reduction. The bulk of the project's benefits (68%) are derived from decongestion on roads as a result of increased rail use. The benefits from time savings make up 14% of the benefits. The appraisal also states that a number of conservative assumptions are chosen to improve robustness and these include measuring decongestion in three ways and choosing the most conservative output, assuming relatively modest time savings for rail users and low passenger growth post 2020 (1%). In addition, the robustness of the benefits are put through a number of sensitivity tests including a 20% decrease in benefits, increase in capital costs, increase in operation costs and a combination of all three. These tests show that the project has a positive benefit even in the face of all three negative shocks.

While the aforementioned methodology displays very broad compliance with the relevant guidance at the time, a number of potential areas where improvement could be targeted include:

- While sensitivity analysis is carried out on the total level of benefits, further justification, rationale and sensitivity analysis could be provided for the main assumptions relating to benefits such as 36% of new rail users being assumed to be diverted car drivers[4] and population projections.
- The appraisal only compares scenarios where no project is undertaken and the full project is implemented. The appraisal could have examined and appraised other options for project delivery such that there were a number of do-something scenarios as recommended in the DoT Common Appraisal Framework.
- The appraisal assumes that the Dart Underground project will be constructed. The appraisal could have provided a sensitivity analysis detailing the value of the project in the absence of Dart Underground. Project appraisals should ideally not be contingent and dependent on uncompleted projects.

Some of these concerns were highlighted in a review of the business case carried out for the Department by Goodbody Economic Consultants. This review stated that 'the process of option identification and choice is not fully reflected in the business case' and 'sensitivity of the demand projections to alternative population projections should have been tested'. However, the audit also states that the project cost is overstated as it assumes no further

[4] Based on estimate from DTO that 50% of new rail users may be transfers from the private car and a 1.4 car occupancy ratio.

investment in, or maintenance of, the current system. The appropriate project cost thus should have been the cost of the do-project scenario minus the cost of the do-nothing scenario. As such, the review states that the economic return to the project is relatively robust and as such should proceed.

Key Document 2: Updated Business Case (2012)

In January 2012 an updated outline design business case was compiled by Iarnród Éireann and submitted to the NTA/DTTaS. The overall objective of the business case was to assess the feasibility and return of the project in the absence of the Dart Underground project in line with an updated delivery strategy. The appraisal analysed two alternatives. Alternative one was to maintain the existing system while alternative 2 was to carry out the Resignalling project.

The projects benefits are stated to come from three sources:

- Consumer surpluses for existing passengers as a result of faster trains
- Consumer surpluses for those rail users who change their route due to the provision of new connections through the city to Grand Canal Dock
- Consumer surplus for new rail users, who have transferred from different modes of transport.

It is important to note that the business case's benefits are based solely on time savings as a result of the project and do not include decongestion benefits like the previous case. The business case states that 'they are not considered as part of this appraisal due to the relative difficulty in understanding the level of capture from road and bus for new rail users'.

The appraisal assumes that passenger growth will be 1.94% per annum over the course of the 30 year time period. While using the 30 year appraisal period, the case assumes that the infrastructure will remain in working order for at least 22 years and this is cited as being reasonable. No residual value is used as it is assumed that the infrastructure will be close to expiry at the end of the appraisal period. Based on this methodology the appraisal finds a time savings benefit of €229.8 million over the 30 years. It is also stated that benefits will arise due to a producer surplus at Irish Rail amounting to €6.3 million over the period. The

report acknowledged a number of other wider benefits which are not possible to quantify such as agglomeration effects and employment impacts.

On costs the appraisal compares the do-nothing scenario to the do-something scenario and finds that the NPV of the costs is negative due to the do-nothing maintenance costs being greater than the NPV of carrying out the project thus leading to an NPV of the costs being minus €38.6 million. Essentially the business case states that the cost of not doing the project exceeds the project cost.

In totality, the business case states that the NPV of the project is €274.7 million with and an IRR of 16.5%. No BCR is provided due to the negative cost of the project.

While the aforementioned methodology displays very broad compliance with the relevant guidance at the time, a number of potential areas where improvement could be targeted include:

- There could have been a greater attempt to appraise each phase of the project separately to decipher whether they are economically viable in and of themselves given the staged nature of the project's delivery.
- Directly related to the above, the appraisal only compares scenarios where no project is undertaken and the full project is implemented. The appraisal could have examined and appraised other options for project delivery such that there were a number of do-something scenarios as recommended in the DoT Common Appraisal Framework. The business case acknowledges that a so called do-partial case exists but this is not appraised.
- The business case presents the NPV of costs as the discounted difference between the do-nothing and do-something scenarios and this has been acknowledged as an appropriate methodology for such a business case in international literature[5]. However, for total clarity the business case could have cited this method as well as a pure do-something cost versus do-something benefit. In addition greater justification for the choice of methodology could have been provided.

Thus, the updated business case displays broad compliance with the Public Spending Code and there are two minor areas where improvement could be targeted for future projects.

[5] See EIB Railway Project Appraisal Guidelines. http://www.eib.org/attachments/pj/railpag_en.pdf

Key Document 3: On-Going Project Reporting

In addition to the project's appraisals, this review also examined a number of reports and documents related to the project's on-going delivery and management. This included, for example, the project implementation plan, the project execution plan and a number of project manager reports. In particular, the review analysed correspondence between the Department and Iarnród Éireann/Irish Rail throughout the process. In general, the correspondence details appropriate management and oversight. It is important to consolidate and build on these elements of good practice.

It should be noted in relation to the early stages of the design and scoping of the original project that practices reviewed under this QA process were in general of a high standard. In 2005, approval was given by the Department for funding of €2 million to set up and equip a signal design office, engage up to 15 engineers/technicians, produce detailed signalling schemes and a client requirement specification for the delivery of the project and produce a robust cost estimate for the delivery of the project. The request for Exchequer funding was accompanied by a Board Paper which set out the decision sought, the background to the project and the relevant information relating to project objectives, cost and envisaged benefits.

However, an interim approval granted for early expenditure for an initial stage of the global project, prior to the approval of a full business case, is deemed not to have been good practice and should not be repeated in future. In November 2007, Iarnród Éireann requested a further €7.5 million to finalise the system design, procure long lead items and progress enabling works, cable route and signal replacement works. The request for funding was accompanied by a similar Board Report to the one previously outlined. In February 2008, the Department approved the funding of €7.5 million for this initial stage on the basis that a full Cost Benefit Analysis would be submitted before the end of April 2008. In such a case, if the funding is viewed as a standalone project, a Multi-Criteria Analysis should be carried out to inform the decision as per central guidelines relating to requirements for various expenditure thresholds. On the other hand, if the funding is viewed as a phase of implementation for the full scheme, a full business case and Cost Benefit Analysis for the full project should be submitted prior to funding approval.

Therefore, the rationale for the approval of the €7.5 million, which related to the overall resignalling project prior to the submission and subsequent approval of an overall business case is not fully evident from the available documentation. This element of the project falls short of full compliance with best practice guidelines. It is acknowledged that pressure relating to the timeframe for completion of the overall project (which early expenditure would facilitate) was an influencing factor at the time.

However, it is noted that in subsequent stages of the overall appraisal of the project, guidelines were fully adhered to. In this context, it is further noted that following submission of the business case for the full project in March 2008, the Department engaged Goodbody Economic Consultants to audit the case and methodology. The audit recommended that the project should proceed. Approval for the full project's capital funding of €123.7 million was sought and approved by the Minister for Transport in September 2008. On the basis of this, approval for capital funding of €49.8 million for the next phase of the project was approved in November 2008.

In terms of the project's current status, phase 1 was commissioned in October 2013 and phase 4 has been deferred due to resource constraints. The construction stage of phase 3 was approved for funding in April 2014 and works are currently under way. The project was recently recommended for further EU co-funding under the Connecting Europe Facility (CEF) by the Innovation and Networks Executive Agency (INEA) and the European Commission with a very positive evaluation report. It is anticipated that phase 3 will be completed in February 2017.

Section B - Step 4: Data Audit

The following section details the data audit that was carried out for the City Centre Resignalling Project. It evaluates whether appropriate data is available for the future evaluation of the project/programme.

Data Required	Use	Availability
Number of Trains Passing Through Rail Lines	Assess difference in number of trains (capacity)	Yes, available from Irish Rail
Average Speed of Trains Passing Through Rail Lines	Assess difference in speed of trains (time savings)	Can be analysed through modelling
Number of Heavy Rail Passengers	Assess difference in train use	Yes, available from Irish Rail
Maintenance Cost Savings	Assess level of cost saving	Yes, should be available through ex-ante and ex-post comparison
Rail Passenger Satisfaction	Measure objective to increase satisfaction (Rail User Survey)	Proxy available through data submitted by Irish Rail to NTA.

Data Availability and Proposed Next Steps

The data requirement listed above relates to the baseline assessment of the project's benefits through an ex-post evaluation. To achieve this each of the project's cited objectives and expected benefits would be quantified and an analysis between pre and post project would be carried out.

As the audit above details, in general the baseline data needs are available. A more detailed analysis of need would be required ahead of any future evaluation or review.

The following section looks at the key evaluation questions for the City Centre Resignalling Project based on the findings from the previous sections of this report.

Does the delivery of the project/programme comply with the standards set out in the Public Spending Code?

This in-depth check has demonstrated that the broad principals and tenets of the prevailing central appraisal and management guidance were adhered to in the on-going management of this project. The primary concern raised by the in-depth check relates to the rationale for the approval by the Department of €7.5 million, which related to the global resignalling project prior to the submission and subsequent approval of an overall business case. However, appraisal of the project was carried out at two stages of project development and the methodology used was, in general, in line with central guidance particularly in the area of general parameters and time period.

The main areas which are cited for improvement relate to the timing of appraisal/decision making and technical details within the business cases. The approval of funding for the initial stage of the project should have been done after the business case and CBA were received and tested for robustness. . In addition, the appraisals that were carried out could have been strengthened by more rigorous sensitivity testing and stronger justification for methodological choices and assumptions.

Is the necessary data and information available such that the project/programme can be subjected to a full evaluation at a later date?

Evaluating the direct benefits associated with the project ex-post would require the availability of a number of different types of data. The majority of required data for baseline assessment is available such as in areas like the number of trains passing through the lines, the number of passengers and the maintenance cost.

What improvements are recommended such that future processes and management are enhanced?

Given the findings outlined throughout the review the following recommendations are made for implementation by the relevant bodies:

- The appraisal of all major investment should continue to be done in line with central guidance i.e. the provisions of both the Public Spending Code (PSC) and the forthcoming DTTaS Common Appraisal Framework (CAF). As such there should be consultation on assumptions and methodology utilised in appraisal between the NTA and DTTaS's EFEU.
- Business cases, CBAs and appraisals should be received and analysed for robustness before any sanction for a significant element of expenditure is given on a major project, in line with the provisions of the Public Spending Code.
- The NTA internal guidelines for the management of its capital programme should be updated at an appropriate time to incorporate the provisions of both the Public Spending Code and the forthcoming Common Appraisal Framework.
- All key methodological choices and assumptions should be fully justified and tested rigorously for sensitivity.
- Future business cases should be conducted such that their outputs are not contingent on other non-finalised projects. In cases where projects are heavily interlinked with other projects, both an analysis with and without the project should be carried out.

Section C: In-Depth Check Summary

The following section presents a summary of the findings of this In-Depth Check on the City Centre Resignalling Project

Summary of In-Depth Check

The overall City Centre Resignalling Project has, and continues to, meet the requirements set out for the management of public expenditure. The project is a multi-stage and complex one which has seen its delivery process change due to national funding developments.

The primary concern raised by the in-depth check relates to the rationale for the approval by the Department of €7.5 million of capital funding, which related to the delivery of the overall resignalling project, prior to the submission and subsequent approval of an overall business case. However, it is noted that in subsequent stages of the overall appraisal of the project, guidelines were fully adhered to. In this context, it is further noted that following submission of the business case for the full project, an independent audit of the business case and methodology recommended that the project should proceed. The in-depth check also identified a number of areas where practice could be improved in the future. These primarily related to technical issues in the compilation of the business case such as further strengthening of the rationale for, and sensitivity analysis of, methodological choices and further appraisal of alternative project options. The in-depth check has made a number of recommendations including that appraisal must be received and tested for robustness before any funding decision is made, all key methodological choices and assumptions should be fully justified and tested rigorously for sensitivity and future business cases should be conducted such that their outputs are not contingent on other non-finalised projects.

An Roinn Iompair Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

Economic and Financial Evaluation Unit

Quality Assurance – In Depth Check

Section A: Introduction

This introductory section details the headline information on the programme or project in question.

Programme or Project Information	
Name	N5 Ballaghadereen Bypass
Detail	A 13.6km standard two lane single carriageway national primary road
Responsible Body	National Roads Authority
Current Status	Expenditure Incurred
Start Date	2001
End Date	2014
Overall Cost	€58.61 million (Budget)

Project Description

Roscommon National Roads Design Office (NRDO) was commissioned, in 2001, by Roscommon County Council to advance the design of the N5 Ballaghaderreen Bypass Road Scheme in accordance with the NRA National Roads Project Management Guidelines (NRPMG).

The scheme is 13.6 km long, commences at the N5 Charlestown bypass, approximately 6km north east of Ballaghaderreen in the townland of Currinah, is crossed by the R293 approximately 2.5km north east of Ballaghaderreen at Tonroe and rejoins the existing N5 approximately 7.5km east of Ballaghaderreen in the townland of Rathkeery. The N5 National Primary Route stretches from Westport (Mayo), through Roscommon to join the N4 National Primary Route at Longford Town; a distance of approximately 134km. It was described in Transport 21 as a "Strategic Road Link" connecting the west and northwest with Dublin and the Eastern Region.

The scheme included the construction of 13.6 km of standard two lane single carriageway national primary road, a grade separated junction with the R293 facilitating access to Ballaghaderreen Town, six bridge structures including the Lung River Bridge and the R293 Bridge, at-grade junctions with local roads and realignment of local roads as appropriate.

Section B - Step 1: Logic Model Mapping

As part of this In-Depth Check, EFEU have completed a Logic Model for the N5 Project. A Programme Logic Model is a standard evaluation tool and is utilised here as a means of distilling information. Further information is available in the Public Spending Code.

Objectives	Inputs	Activities	Outputs	Outcomes
• Reduction in journey times and journey time variance along the N5 with the consequent positive contribution to the economy; • Improvement in road safety both within the town and on the National Route that will reduce the number of fatalities; • Improvement in the town environment of Ballaghaderreen, through significant reduction in noise and air pollution; • Reduced community severance due to the removal of significant through traffic from the town centre, particularly heavy commercial vehicles; and • Directly improve a significant section of the existing road transport link between the Gateway city of Dublin and the West of Ireland in particular the hub towns of Castlebar and Ballina and Ireland West Airport Knock.	• Department and Agency administrative costs • Budget Costs - €58.61m ○ Construction costs – €30.02m ○ Land and Property - €9.9m ○ Planning and Design – €3.3m ○ Supervision - €6m ○ Archaeology - €1.8m ○ Advanced works and other contracts - €2m ○ Residual Network - €2.8m ○ Programme risk - €2.79m	• Road construction, • Bridge construction, • Accommodation Works, • Interim diversions to existing services • installation of public lighting, signing, lighting and other works essential to a road scheme	• Construction of a grade separated junction with the R293 facilitating access to Ballaghaderreen Town; • Construction of six bridge structures including the Lung River Bridge and the R293 Bridge; • Construction of at-grade junctions and realignment of local roads as appropriate • Accommodation works associated with the affected landowners; • Amendments and diversions to existing services; and • Provision of mitigation measures, public lighting, signing, lighting and other works ancillary to the construction and operation of a road scheme.	• Decrease in Journey times and increase in reliability ○ 72% of journeys will divert to the bypass ○ Journey diverting to the primary route receive a time saving of 2.5 minutes ○ This will lead to an slight improvement in the link between Dublin and the West of Ireland • 9.9% accident reduction • Reduction in Noise and Emissions (CO_2, PM_{10} and NO_2)

Description of Logic Model

Objectives: The objectives of the N5 Ballaghaderreen Bypass project were to reduce journey times and increase reliability along the N5, improve road safety both within the town and along the national route and improve the environmental situation within the town by reducing noise and air pollution. The scheme also targeted a reduction in community severance due to the removal of significant through traffic from the town centre, particularly heavy commercial vehicles and to improve a significant section of the existing road transport link between Dublin and the west of Ireland.

Inputs: The total inputs for the programme are the budget cost of €58.61m. This budget consists of the following costs; construction, land and property acquisition (approx. 207 acres and 121 landowners including occupied house, two unoccupied dwellings and a number of Agricultural sheds), planning and design costs, supervision, archaeology, advanced works and other contracts, residual network and programme risk. Inputs would also include administrative costs of the Department of Transport, Tourism and Sport and the National Roads Authority.

Activities: There were a number of key activities carried out through the project mainly relating to construction. Over the course of the project the scheme promoters engaged in road and bridge construction, installation of public lighting, signing, lighting and other works essential to a road scheme and providing diversion services while works were carried out.

Outputs: Having carried out the identified activities using the inputs, the outputs of the project are 13.4km of road including a separated junction with the R293 which facilitates access to Ballaghaderreen Town, six bridge structures including Lung River Bridge and R293 Bridge, at–grade junctions and realignment of local roads. The works also included accommodation works with affected landowners and provision of public lighting, signing, and other works ancillary to the construction and operation of the scheme.

Outcomes[6]: The envisaged outcomes of the project were to decrease journey times and increase reliability on the National route. The journey time saving on the national primary route was approximately 2.5 minutes for 72% of the current traffic passing through Ballaghdereen. This translated to €42.44m in consumer benefits, €26.8m in business benefits and €0.21m in Private sector provider impacts. The reduction in journey times also improves the link between Dublin and the west of Ireland.

In terms of safety improvement it was estimated that accident benefits would be €2.17m over the duration of the scheme, which is the equivalent of 9.9% accident reduction. The scheme also targets a decrease in noise and pollution as a result of the scheme with these benefits estimated to equal €1.46m, which is a reduction of 434 tonnes of CO_2 emissions, 71 tonnes of NO_2 emissions and a reduction in 4 tonnes of PM_{10} emissions as well as a reduction in noise levels of 5dB for the period of assessment.

[6] All values are presented in 2009 prices and are taken from the low growth scenario of the NRA's Project Appraisal Guidelines – Unit 5.5: Link-Based Traffic Growth Forecasting.

Section B - Step 2: Summary Timeline of Project/Programme

The following section tracks the N5 Ballaghaderreen Bypass Project from inception to conclusion in terms of major project/programme milestones.

September 2001	First Public Consultation
June 2002	Second Public Consultation (route options)
September 2002	Constraints Study Final Report
September 2002	NRA approve constraints study report and the Phase 3 Constraints Study Questionnaire
February 2003	Public Consultation for Route Corridor
January 2006	Route Corridor Selection Reports (Volume 1 – 4)
June 2006	NRA approval to proceed for draft route selection report and preliminary design report
March 2007	NRA approval to proceed with the publication of CPO
October 2007	Preliminary Design Reports (Volume 1 – 4)
July 2010	CPO documentation was published and submitted to An Bord Pleanala
January 2011	Scheme approved by An Bord Pleanala
November 2011	Bypass included under improvement schemes for the Infrastructure and Capital Investment Framework 2012-2016
November 2011	Tender process commences
July 2012	Tender return date
August 2012	Tender report including overview and assessment of tenders
September 2012	Business Case including Traffic modelling report, Cost Benefit Analysis, PABS and Project Brief
September 2012	Audit by NRA on Business Case, including Traffic modelling report, Cost Benefit Analysis, PABS and Project Brief

September 2012	NRA Approval to award construction contract for the sum of €24,044,650 (excluding VAT)
October 2012	Letter of acceptance issued
November 2012	Contract for works is signed and construction commences
March 2013	Initial referral to conciliation
July 2014	Conciliator's recommendation
August 2014	Substantial Completion Certificate issued
August 2014	NRA Approval to fund conciliation settlement
August 2014	Roscommon County Council and Wills BROS LTD execute final account deed and settlement agreement

Section B - Step 3: Analysis of Key Documents

The following section reviews the key documentation relating to appraisal, analysis and evaluation for the N5 Ballaghaderreen Bypass Project.

Project/Programme Key Documents	
Title	**Details**
Constraints Study Report	A constraints study area, measuring approx. 54km^2, centred on Ballaghaderreen was developed within which feasible route corridors could be developed. The study area was examined to identify all constraints of an engineering, environmental, economic or legislative nature that could hinder the development of route corridor options.
Route Corridor Selection Report	A comprehensive assessment of the route corridors under environment, economic and engineering headings was undertaken in order to determine the best overall solution. Four route corridors including an on-line "Do- Minimum" option were identified for the scheme. The preferred corridor complied with Local and National policy, had the least environment impact, the least impact on agriculture, lowest cost and generates the greatest time saving and economic benefits. In addition, the corridor does not hinder the future development of Ballaghaderreen and allows considerable room for the town to expand/develop.
Preliminary Design Report	The Preliminary Design Report is presented in four volumes. The first volume contains the executive summary and includes the main body of the Design Report (including Traffic, Geometrics, Structures, Drainage, Utilities, Public Lighting and Signage, Landowners and Accommodation works, Compulsory Purchase Order, Part 8 Planning Procedure, Scheme Safety Audit, Environmental Review and Scheme Costs). The Second volume contains the scheme drawings, the third volume contains

	technical, environmental and economic reports and the fourth volume contains the Preliminary Ground Investigation Factual Report.
Project Brief	The Project Brief identified the need for the scheme and sets out the project objectives. It considered the existing, and likely future, problems and reports on the options that have been considered. It also provided a history of the development of the project.
Traffic Modelling Report	Provided a description of the techniques that were used to model the situation both existing and in the future, and what the forecasted impact of the scheme is.
Cost Benefit Analysis	This output provided an economic assessment of the costs and benefits of the scheme in order to determine if the scheme is economically worthwhile. The BCR under a low growth scenario was 1.82.
Business Case	This Business Case outlines the need for this scheme, as well as its main objectives. The design and appraisal of the scheme during the route option and preliminary design stages is briefly summarised, and details are provided of the proposed budget costs and risk assessment, as well as the proposed procurement and implementation of the scheme.
Project Audit Report	NRA carried out a project Audit to ensure compliance with the Value for Money Code focusing on Sufficiency of Information Provided for the Audit, Data Collection, Key Assumptions, Scope and Quality of Technical Analysis and Presentation of Results.

Key Document 1: Constraints Study

The Constraints Study Report was finalised on the 26/9/02. The study considered a 54 square kilometre area encompassing a number of town lands surrounding Ballaghaderreen. The study was not rigidly limited to just this area as influences outside the area could still have an impact on the route and from constraints to a possible solution.

The report considered the need for the scheme, existing land use, first public consultation, a windscreen survey and a detailed analysis of the constraints to route selection.

This detailed analysis included issues concerning planning, land registry, drainage and water quality, hydrogeology, utilities, archaeological, designated sites within 10km, existing road network, accidents, traffic, geology, local economy, geology, aesthetics, development plan zoning, borough impacts, legislation and other constraints.

Overall the quality of the document was good with a high number of issues considered in a very detailed manner.

Key Document 2: Route Corridor Selection

The route corridor selection report was finalised in January 2006 by Roscommon County Council. The report provided a comprehensive overview of the route selection process.

Corridor A in the report was the chosen option because it was the least impactful on agriculture, archaeology, the natural environment, residential properties, and it was the most economically advantageous option. In engineering terms, Route A was the shortest route and had the greatest journey time saving.

In general the document provides a clear assessment of the routes and highlights the major issues with each of the routes considered and logically arrives at the preferred route through the assessment of environmental, economic and engineering issues.

Key Document 3: Preliminary Design Report

The Preliminary Design Report was delivered by Roscommon Roads Design Office in October 2007. The report built on the previous reports and gave more details regarding the issues that were addressed in the constraints report.

Key Document 4: Business Case

A Business Case was prepared on behalf of Roscommon County Council. The first draft was delivered on the 17/8/12 and the final draft was delivered on 6/9/12.

The Business Case first presents the analysis tools and project context before outlining the consideration of options and defining the preferred option. The document then briefly explains the results of the Constraints Study and the Route Corridor Study, including the Options Appraisal. More detail is then provided on the Preferred Option (engineering,

economic and environmental) before providing details on the Preferred Route Appraisal. Finally, brief consideration is given to the Risk Assessment, Procurement (Design and Build) and Implementation aspects of the project.

The business case would benefit from further detail regarding the evaluation of the infrastructure investment in the future. While a lot of the evaluation data can be obtained from pre-existing sources (i.e. NRA traffic count data), the objective of community severance will be difficult to evaluate without a clear methodology to measure the impact pre and post the intervention. The majority of data and analyses in the report is of a high standard although some chapters, particularly the Risk Assessment and Implementation, are lacking sufficient detail. The additional details that could be included are how the value of risk that is included in the project budget is arrived at and how the 27 months of works breaks down into different deliverables.

Key Document 5: Cost Benefit Analysis

A Cost Benefit Analysis was prepared on behalf of Roscommon County Council. The first draft was delivered on the 16/8/12 and the final draft was delivered on 6/9/12. The CBA was prepared using COBA 11 software.

The parameters used are in line with the sectoral guidance with a discount rate of 4%, time horizon of 30 years, 2009 base year, includes residual values and references the NRA project appraisal guidelines which are consistent with the CAF guidelines and values. The appendices also provide more detail on how the costs and benefits break down among transport users (Cars and Private LGVs, Goods vehicles and Business LGVs and Bus and Coaches) which provide more detail on the beneficiaries of the scheme. In terms of financial assessment, the impact on public accounts is provided but no assessment of the cash flows is provided.

Overall, the quality of the CBA is of a high standard although no attempt is made to quantify the benefits of how reduced traffic within the town environs has contributed to reducing community severance. Also, as noted in the NRA project audit, accident rates are generic rather than specific to the route.

Key Document 6: Project Brief

A Project Brief was prepared on behalf of Roscommon County Council. The first draft was delivered on the 17/8/12 and the final draft was delivered on 6/9/12.

The project brief gave a brief history of the project, outlined the need for the scheme and its strategic fit, identified the scope and constraints, defined the objectives and provided the expected functional and operational outcomes.

The most recent appraisal guidance from the Department of Public Expenditure and Reform requires that the project brief should have the programme for completion of works, an

outline of the services to be provided by specialists (consultants, architects, engineers, etc.) and cost targets for the scheme. These items are not included in the project brief.

The items that have been included are of high quality. One issue with the information contained in the brief is that the objectives have no specific targets and don't include the expected time frame to realise each particular objective. There is also no estimate of overall cost, programme for completion of works and no outline for services is provided.

Key Document 7: PABS

A Project Brief was prepared on behalf of Roscommon County Council. The first draft was delivered on the 17/8/12 and the final draft was delivered ion 6/9/12.

The PABS provides an overview of the costs and benefits assessed for the scheme. Costs and benefits comprise both monetised and non-monetised elements. The summary sheet is compliant with the Common Appraisal Framework in that it assessed the project across the relevant criteria (i.e. Environment, Safety, Economy, Accessibility and Social Inclusion and Integration) for both the Low Growth and High Growth scenarios.

Section B - Step 4: Data Audit

The following section details the data audit that was carried out for the N5 Ballaghaderreen Bypass Project. It evaluates whether appropriate data is available for the future evaluation of the project/programme.

Data Required	Use	Availability
Distribution of journey times per day/week/year	Assess if journey reliability has improved and assess the environmental impacts	Periodic journey time measurements have taken place since the project opened to traffic
Journey times in locality and on bypass pre and post road construction	Assess time saved from the construction of new road	Periodic journey time measurements have taken place since the project opened to traffic
Number of vehicles particularly HGVs coming into the town	Assess the town severance and environmental impacts	Can be measured through application of best practice guidelines
RSA number of collision in Ballaghaderreen link and on Bypass link	Assess the safety improvement on the road	Road Safety Authority can provide the statistics

Data Availability and Proposed Next Steps

The majority of the data collection would rely on carrying out follow-on surveys. Roscommon County Council has already undertaken empirical journey time measurements since the project opened to traffic. Time savings in excess of 4 minutes and 30 seconds were recorded via the bypass as opposed to travelling through the town and this occurred under free flow conditions. The approach to the measurement of community severance should be strengthened through appropriate data collection that follows best practice guidelines, for example, see Section 5 of the UK Department for Transport 'Social Impact Appraisal' (November 2014)[7]. The accuracy of the safety measurement can be improved by using RSA statistics on that specific route to estimate the benefit of an increase in road safety.

[7] https://www.gov.uk/government/publications/webtag-tag-unit-a4-1-social-impact-appraisal-november-2014

The following section looks at the key evaluation questions for the N5 Ballaghaderreen Bypass Project based on the findings from the previous sections of this report.

Does the delivery of the project/programme comply with the standards set out in the Public Spending Code?

This in-depth check has demonstrated that the broad principals and tenets of the prevailing appraisal and management guidance were adhered to in the on-going management of this project. The standard in the assessment of the N5 bypass satisfies the conditions set out in the Public Spending Code with the exception of the timeline of events. The objectives were defined, albeit at a late stage in the project process, through the project brief. A number of different routes were considered taking account of the constraints associated with each option in the Constraints Study and the Route Corridor Selection Report. The Business Case document, the Project Appraisal Balance sheet and the Cost Benefits Document analysed the main option in detail under two growth scenarios which provides the sensitivity analysis.

In terms of timelines, it would appear from the available documentation that the preliminary route analysis was followed by the planning and tender stages, although the 2005 Department of Finance Guidelines on Appraisal and Management of Capital Expenditure Proposals in the Public Sector require detailed appraisals and approval of this work to be carried out before the planning and tender process. The project brief was also produced at this stage whereas it should have been written at the very start of the process, although most of the information required for the initial project brief was contained in the Route Selection and Route Constraints report. However, it should be acknowledged that the project commenced in 2001, prior to Department of Finance Guidelines on appraisal, was developed in accordance with NRA project management guidelines and there was therefore no requirement to produce a project brief at that time. It is understood that the project brief was produced in September 2012 for completeness of the overall suite of appraisal documents. The NRA has subsequently confirmed that all major projects currently being developed are following the prescribed timeline of events and document production.

Is the necessary data and information available such that the project/programme can be subjected to a full evaluation at a later date?

It is unclear whether the necessary data and information is available for a full evaluation of the infrastructure at a later stage. Junction surveys were carried out in Ballaghaderreen in July 2006 and these could be used as the baseline scenarios for the number of vehicles entering the town compared to the number now – this data should be complemented with the number of vehicles on the alternative route to give the full estimate of vehicles now using both links. The NRA has provided data from the traffic counter on the Ballaghaderreen bypass. This is indicating an Annual Average Daily Traffic volume of 4,638 west of the

junction and 4,885 east of the junction with the R293 which is higher than the high growth figures given in the project Traffic Modelling Report.

Depending on the quality of the road surveys, reliability and community severance may also be estimated from these 2006 surveys, although if the surveys do not have the sufficient data these objectives may prove difficult to measure directly due to a lack of local data. It is recommended that attention be given to good guidance available in relation to assessing community severance impacts, particularly in cases where it has been listed as a key project objective. The Road Safety Authority has historical road safety statistics which should be used to measure the change in collisions before and after the road construction. Expected emission reductions are presented in the report and could act as a basis to compare against the actual observed emissions reduction.

What improvements are recommended such that future processes and management are enhanced?

There is scope to improve the management of the process at the appraisal and planning stage. Improvements could be made to the management of this stage by:

- Ensuring all Preliminary Approvals to go through the Detailed Appraisal process before any tender or planning processes are entered into in line with both Project Appraisal Guidelines and central expenditure guidelines
- Ensuring a Project Brief document is formulated before the preliminary analysis to ensure compliance with guidelines.

Although it is too early at this stage to have any evaluation or post implementation review, as the project was only completed in August 2014, it is important that post project reviews are undertaken within a reasonable timeframe, as per Public Spending Code requirement, to assess whether project objectives have been met and that lessons learnt can be applied. In carrying out such a review we would recommend that the issues identified in this in-depth check be taken on board.

Section C: In-Depth Check Summary

The following section presents a summary of the findings of this In-Depth Check on the N5 Ballaghadereen Bypass Project.

Summary of In-Depth Check

Overall the process and document preparation is consistent with prevailing guidelines. The quantitative and qualitative appraisal process included a detailed examination of the various route options and associated constraints for the by-pass in order to identify the preferred route along with the preliminary design study which all formed part of the preliminary appraisal. The detailed appraisal included a Project Brief, Traffic Modelling Report, Cost Benefit Analysis and Business Case. The Project Appraisal Audit is a particular strength of the NRA appraisal process, creating a feedback loop which will improve the quality of submissions. One issue which emerged during the course of this in-depth check related to the project timeline sequence. It is acknowledged that this relates to differing guideline requirements in place when the project originally commenced in 2001. The NRA has subsequently confirmed that all major projects being developed are following the current prescribed timeline of events and document production.

It should be highlighted that the NRA has a robust process in place for ensuring compliance with internal project management guidelines (PMG). This is achieved through the NRA Regional Management (RM) team working closely with Local Authorities and through the reviewing of deliverables throughout the development of a project. The NRA RM team for any given County Council is the NRA Regional Manager (RM) and the NRA Inspector. There is a specific Steering Committee for each project and the committee meets generally every month. The Project Engineer from the Local Authority has a monthly progress report presented to the steering committee and the RM team oversee the progression of the project, ensuring that compliance with the PMG is being observed. With reference to the deliverable items which must be produced during the development of a project such as the Design Report or the Environmental Impact Statement, funding requests from a Local Authority must be approved by the NRA Inspector and that approval is dependent on the acceptability of the report in question.

In summary, the overall process meets the requirements set out for the management of public expenditure. In future projects, the Sponsoring Agency and Sanctioning Authority should continue to ensure that the project is progressed to detailed appraisal stage prior to going to tender, in line with guidance. The NRA should continue to review other business cases to ensure that Sponsoring Agencies are fulfilling their responsibilities as required under the relevant guidance documents, particularly the Public Spending Code which has now succeeded the Guidelines for the Appraisal and Management of Capital Expenditure Proposals in the Public Sector. For example, the new spending code guidelines require projects and programmes to have an evaluation plan which details how the project will be measured after completion. This is a new requirement but should be incorporated into all projects into the future.