National Roads Authority

Report on Network Tolling Options

Date: 1 November 2010

Information Note: This report was prepared for the Department of Transport by the National Roads Authority on the basis of information and documentation obtained from a number of sources including third parties.

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1. Summary

1.1 Key Points

1.1.1 This report is issued in response to a request from the Department of Transport to advise on the feasibility of raising additional income from additional tolling on the national road network. The request follows the approval by Government of the Department of Finance's 'Infrastructure Investment Priorities 2010-2016 - A Financial Framework[1]' which noted the possibility of raising €200 million per year in funding to contribute towards the costs of maintaining the national road network.

1.1.2 The DoF report outlined that this could be achieved through one or more of the following means:

- **Option A** - Raising toll rates on existing facilities;
- **Option B** - Introducing new tolls on existing roads; and
- **Option C** - Introducing new tolls on new roads.

1.1.3 This options report concludes that it is feasible to raise gross tolling income of the scale envisaged and details the potential ranges of gross and net revenue relating to Options A, B and C set out above.

1.1.4 The options considered are all based on implementing additional 'point' tolling, as are all the toll schemes on the network at present. The longer term thrust of EU policy is in favour of distance based tolling (in particular for HVGs) which may ultimately only be delivered by closed tolling networks with entrance and exit charging or some form of satellite tolling, as with HGV tolling in Germany. However this is not likely to be imposed within the foreseeable future (i.e. the next decade) for passenger vehicles. The EU is also promoting the full recovery of internal and external costs (i.e. 'users pays' and 'polluter pays' principles), where tolling is applied, particularly in relation to HGVs. Finally, EU policy is directing road authorities towards the use of electronic tolling without barriers.

1.1.5 Tolling can also be used for demand management purposes such as with Dublin Port Tunnel, and there may well be a need for this type of option on the more congested segments of the network in the future. While we cover this issue in this report, the focus has been on responding to the Government's revenue raising objectives rather than the challenge of managing future demand.

1.1.6 We would draw attention to certain key issues for consideration:

- The revenue raising potential through tolling is significant, and the national road network would benefit from additional funding.
- However, the administration and operating costs of toll systems can be relatively high, regardless of the choice of tolling technology although 'barrier-free' systems are more efficient with more toll points which is not the case with conventional 'barriered' systems. In addition tolling income will also be reduced by VAT and rates.

[1] Weblink http://www.finance.gov.ie/documents/publications/reports/2010/capitalreview.pdf

- The figures contained within this report are primarily derived from a recent report commissioned by the NRA to investigate and assess a range of tolling schemes on the network in line with DoF recommendations. They are based on a number of assumptions including, for example, toll charges, traffic and diversion levels, application of taxes and rates and assumptions on operating costs and efficiencies of scale and should therefore be considered as indicative figures for the purposes of aiding the decision making process at this stage. More detailed assessment would be done if it is decided to pursue any or all of the options.
- There is a statutory process involving publication of toll schemes and bye-laws and public consultation before any new tolling options can be implemented.
- The report considers all of the tolling options noted in the Department of Finance report, but it should be noted that in the absence of a reasonable level of user acceptance diversion rates could be much higher than envisaged.
- We envisage should the Government decide in principle to proceed with all or any of the options, that the NRA will prepare a plan for implementation which, when agreed, we would progress with to implementation (subject to the necessary statutory processes). The schedule for implementation of new tolling schemes depends on the option(s) selected, and is discussed in more detail in the body of this report.

1.2 Report Structure

1.2.1 The remainder of this report is structured as follows:

- **Section 2 – Background & Context;** this section sets out the background and context to the tolling strategy and plans, including how they fit with the NRA's broader network management strategy, in addition to the core objective of increasing toll revenue, and the critical factors which have influenced the development of this report on tolling options.
- **Section 3 – Network Tolling Strategy and Plan;** this section of the report sets out the basis for the selection of potential additional tolling locations throughout the national road network and the key issues which require careful consideration in preparing a coordinated national tolling programme; and
- **Section 4 – Next Steps;** this section sets out the next steps required following Ministerial approval including the main building blocks and an indicative delivery programme.

2. Background & Context

2.1 Introduction

2.1.1 The NRA's proposals as to how additional tolling on the network might be introduced are in response to the recent Department of Finance recommendations to investigate options to generate additional revenue for infrastructure maintenance and development. In reviewing alternatives for the Minister's decision, we also give consideration to strategic plans for managing demand and 'locking in the benefits' from the new motorway and dual carriageway network over the longer term.

2.1.2 The proposals to investigate options for additional tolling on the network were prompted by the current economic conditions and therefore focussed on generating additional tolling income to contribute, primarily, to the operation and maintenance costs of the network. This effectively means that the NRA would collect and retain this income thereby reducing Exchequer funding requirements.

2.1.3 In preparing this report on options for additional network tolling, we note that there are two sides to the tolling debate, covered below. Additionally, we note that the global shift towards sustainable economic development is changing the traditional view of tolling as a funding device to tolling as a form of user charging to encourage more sustainable development and use of infrastructure.

2.1.4 The advantages of more tolling from a financial perspective are clear – as it would mean that the NRA would collect additional tolling income to use to maintain the network. This would reduce the burden on the Exchequer and could potentially free-up funds for necessary network enhancements. From an operational level tolling can also assist with demand management on critical parts of the network over the longer term and in this context, it is also worthwhile highlighting that tolling which assists with the management of demand can reduce capital funding requirements by eliminating or deferring the need to provide additional future capacity.

2.1.5 In terms of the main disadvantages, we note that tolling as a form of revenue generation is far less efficient than other forms of revenue generation such as an increase in fuel tax, although the trends in vehicle fuel efficiency and policies to reduce consumption are expected to impact on fuel taxes over the medium term.

2.1.6 Also while public acceptance of the existing tolling schemes is reasonably positive, we would anticipate significant challenges in gaining road user acceptance for additional tolling on the network. This may be exacerbated given that more 'point' tolling as opposed to distance based tolling is being proposed and this can generate issues and opposition in the vicinity of new toll points as it may be seen as unfair (i.e. *"why do we have to pay a toll while other people don't?"*).

Figure 1 – Barrier-free Tolling Gantries on M50.

2.2 Policy / Direction

2.2.1 EU policy is clearly pushing transport authorities towards the internalisation of the external costs of transport across all modes, which in effect involves the promotion of the 'User Pays' and 'Polluter Pays' principles. The stated aims resultant from internalisation of costs include, for example, efficiency improvement in road transport and modal shift, positive long term change of logistics behaviour and business processes, reduction of CO2 emissions and fuel consumption, reduction in congestion on motorways and local roads and significant annual net welfare gains[2].

2.2.2 Of particular relevance and impact in this area for the national road network is the European Electronic Tolling Service directive (EETS) and the emerging directive on the charging of Heavy Goods Vehicles amending the earlier Directive 1999/62/EC. While there may be certain challenges relating to aspects of the business case and the timescales for technical deliverability of both directives, at the very least there is a requirement for the NRA to ensure that the future tolling business model and systems are designed in compliance with existing and future regulations in these areas.

European Directives:

- **EETS Directive** - to promote interoperable tolling across the EU;
- Irish challenge to integrate European tag providers into Irish toll roads – commercial, legal and technical aspects;
- **Draft HGV Directive** – charging of HGVs using certain infrastructure;
- Promoting tolls as distance based and 'polluter pays' principle through external cost charges.

2.2.3 While the current position with regard to Ireland's involvement in EETS is being considered by the Department of Transport, it is likely that opening up the Irish tolling sector for European traffic and facilitating electronic payment of tolls across the EU can be accommodated within the current business model and infrastructure which currently enables national interoperability. It is not clear or fully determined which parties (i.e. toll roads, interoperable road users or Member States) will finance the introduction of European interoperability or the ongoing operational costs.

2.2.4 The current draft HGV directive[3], which promotes the concept of distance based tolling, is directing Member States implementing toll schemes to provide for the inclusion of an environmental charge (e.g. to compensate for air and noise pollution) in addition to an infrastructure usage charge. It is likely that this directive will impose restrictions with respect to charging structures which, for example, may limit our ability to introduce discounts for regular ETC users as well as introducing new EU approval procedures for new tolling schemes in Ireland.

2.2.5 The draft HGV directive also promotes electronic barrier-free tolling commenting that "*the use of electronic tolling is essential to avoid disruption to the free-flow of traffic and to preventing adverse effects on the local environment caused by queues at toll barriers*".

[2] Pricing and funding: internalisation - State of Play within the EU- Current and upcoming policies affecting road user charging; Feb 2010, Brussels. A Eordogh, DG Energy and Transport.
[3] Ref: 12495/10 – TRANS 199 FISC 75 ENV 506 CODEC 723, Dated 29 July 2010;

2.2.6 At a national level and for somewhat different reasons, the McCarthy Report to Government in early 2010 recommended some form of national road user charging as a means of raising revenue. This was followed more recently, by the Government's capital investment framework for the next 5-6 years which was set out in a report published by the Department of Finance in July 2010 entitled 'Infrastructure Investment Priorities 2010-2016 - A Financial Framework'.

2.2.7 The DoF report outlined the challenging economic backdrop for investment and recommended that the NRA seek to recoup an additional €200 million per annum in tolling income to contribute towards the funding requirements, in particular to contribute towards the cost of maintaining the new network.

2.2.8 By way of comparison, it is estimated that the 11 existing toll points currently generate gross revenues (before operating costs, taxes and rates) in the region of €230 million on an annual basis, with the M50 accounting for about 40% of that figure.

2.2.9 The Department of Finance also noted that in the current climate there is no potential for the private sector to build roads without State support, even in cases where it is possible to toll the road, as such income would only be expected to cover a portion of the initial capital and ongoing operations and maintenance costs, but none of the cost for land acquisition, planning and advance works.

2.3 Background & Changing Environment

2.3.1 Over the past decade the NRA has overseen significant investment in the Irish road network including the construction of a new motorway and dual carriageway network which comprises the Major Inter-Urban Routes' (MIUs), the M50 C-Ring Motorway, the M3 Dublin to Kells, the M/N17 Limerick to Gort and much of the M/N11 Dublin to Gorey corridor and Dublin Port Tunnel.

Major Inter-Urban Routes –Key Facts:

- Over **1000km** new road, of which 750km is dual carriageway:
  - Dublin to Border (M1);
  - Galway to Dublin (N4/N6)
  - Cork to Dublin (N8);
  - Limerick to Dublin (N7); and
  - Waterford to Dublin (N9),
- Cost: **€8000 million** - financed by:
  - EU €800 million (10%)
  - Private Sector €1,300m (16%)
  - Exchequer €5,900 million (74%) (incl. €600 million VAT);

2.3.2 Approximately three quarters of the funding required for the MIUs was provided by the Exchequer, with the remainder provided by the EU and through the use of Public Private Partnerships (i.e. private finance).

2.3.3 The PPP roads account for about 275 km of the motorway network and most are funded on the principle that the tolling income funds the operating and maintenance costs as well as much of the construction costs. This effectively means that the road users who derive the benefits from the new PPP roads (e.g. improved journey times and reliability) pay directly for those benefits.

2.3.4 For the remaining (and majority) of the new motorway network the operation and maintenance costs are funded directly by the Exchequer. The introduction of new tolling schemes on this residual portion of the network will lead to the costs for maintaining the new infrastructure being covered by the users of this new infrastructure, as opposed to being sourced solely from the Exchequer.

2.3.5 In tandem with the roll out of the new motorway network, the NRA has also overseen the delivery of a significant tolling infrastructure nationally (as indicated in the table below), with 11 toll points on the current network. This has resulted in significant rises in the number of journeys which are tolled on a daily basis (AADT) across the network – from approximately 96,000 in 2003 to 234,000 in 2010.

2.3.6 The push towards distance based tolling / charging requires particular consideration regarding the current Irish tolling infrastructure which is comprised of individual toll points within an open network - rather than a closed system with entry and exit points. While an open system is financially more sustainable (i.e. from not having to toll all the entry and exit points) it requires more careful consideration in specifying the location of new toll points to ensure that the charging framework is equitable and in line with a distance based charging framework than would be the case with a more expensive closed infrastructure.

Tolling - Key Changes:

- 2003 – 2010 - New motorway network with 11 toll points;
- 2007 - Introduction of national interoperability (*a first in Europe*);
- 2008 - Introduction of multi-lane free flow on M50 (*a first in Europe*);
- 2008 - Introduction of Independent Tag Providers;
- Ongoing investment in ETC lanes;
- 2010 – Preparation for EU Directive for European interoperability (EETS);
- 2012 – EU Directive HGV charging;

The Changing Role of the National Roads Authority

2.3.7 Following on from this recent period of significant infrastructure delivery and the completion of the major interurban network, the NRA's focus is changing towards managing and protecting the infrastructure network through a series of policy, technological and contractual initiatives.

2.3.8 This shift in focus is underpinned by the NRA's strategic planning function which has commissioned a number of relevant strategic studies in addition to enhancing internal capabilities to model and evaluate potential future scenarios using the new national traffic model and more robust project appraisal frameworks.

2.3.9 Planning is required to ensure that the capacity and effectiveness of the new network is not compromised by inappropriate and/or damaging developments, which could compromise the network to such an extent so as to require the construction of a new network segments.

2.3.10 The work on developing longer term strategies for managing and protecting the new network commenced against a backdrop of emerging policy in the transport sector (at national and EU level), particularly regarding the push towards more sustainable transport. This in turn has prompted more interest in the role that tolling and road user charging can play in this area.

2.3.11 Commentators of the current financing models (in many jurisdictions) consider that they do not provide an effective means of controlling demand in time periods and geographical areas of peak loading, and argue that "*demand pricing can break the circle: as charges are levied selectively which controls excessive congestion and yields revenues for new capacity as it is really needed*".[4]

2.3.12 While it is difficult to forecast the future given the current economic conditions and the recent reversal in key drivers for transport demand which the Department of Finance report refers to, the current estimates over the long term (i.e. the period to 2025) indicate significant demand for travel on the network (in the region of 50% over 15 years). While we should be cautious about these forecasts, we should also acknowledge that growth at this scale will lead to notable deterioration in the levels of service on the road network, with deterioration most noticeable in major urban areas.

2.3.13 Increases in infrastructure capacity (i.e. road building) could support such increases in demand, but obviously this would be expensive and would also generate additional demand, which in itself may not lead to tangible benefits to the economy.

2.3.14 The challenge for the NRA therefore is to design an appropriate set of measures for the network which will ensure that the growth in travel demand will be appropriately managed, but in a way which ensures that outcomes support broader European and national goals relating to sustainable economic and social policies, and in particular transport policies.

2.3.15 In broad terms the options for managing demand range from control measures such as access control and flow management (i.e. "*managed motorways*") to fiscal measures such as tolling or road user charging. The challenge is one which is being met with increasing success by roads authorities throughout the world, who employ techniques to manage more mature road networks through provision of information, active management of traffic flow, and achieving allocative efficiency with respect to the provision of road space using fiscal strategies which include tolling.

New Developments in Tolling Technology

2.3.16 In conjunction with delivery of the new motorway network and the delivery of the existing tolling infrastructure, the NRA has had a policy of promoting the introduction of Electronic Toll Collection (ETC) across the individual toll roads and full interoperability for ETC users across the network.

[4] Findings from a Road Pricing Experiment, Symposium on Mileage-Based User Fees, April 14, 2009; Matthew Kitchen, Puget Sound Regional Council.

2.3.17 The implementation of this policy has resulted in ETC interoperability being an important feature of the Irish motorway network today – to the significant benefit of regular road users. It has also provided a platform for facilitating increasing levels of ETC coverage across the network.

2.3.18 In many ways the development of ETC has largely gone unnoticed in Ireland. For example, it was referred to by president of the Chartered Institute of Logistics and Transport in 2009 as "*a quiet revolution occurring in Ireland in terms of how people pay for road use*"[5].

ETC - Rationale

ETC contributes towards more efficient and effective tolling by:

- Increasing vehicle throughput at toll plazas - thereby reducing congestion / bottlenecks;
- Reducing resource requirements and operating costs;
- Additionally, there is an economic rationale in terms of general economic benefits such as travel time savings and environmental benefits (e.g. lower emissions at plazas).

2.3.19 While national interoperability between all toll roads has initiated the step change in ETC levels across the network, the introduction of barrier-free tolling on the M50 Motorway in August 2008 has further amplified this.

2.3.20 Barrier-free tolling – also know as Open Road Tolling (ORT) – in contrast to the deployment of national interoperability, was a hugely public project. Following a challenging launch the operation has now settled down and road users are familiar with the concept of barrier-free tolling.

2.3.21 In addition to the obvious free-flow benefits which generate significant economic, environmental and safety benefits for road users and the economy in general, these types of systems provide significant advantages over the more conventional tolling plazas (with barriers) for other reasons.

M50 Barrier-free Tolling - Key Facts:

- Traffic volumes ~ 98,000 AADT; (highpoint ~ 119,685 4th June)
- Traffic mix - Registered 75% v Unregistered 25%;
- Total Collections to date – €172m;
- Tolls ~ 90% : Penalties ~ 10%;
- Average yield per vehicle ~ €2.75 to date (2010);
- Over 45% growth in customer base since August 2009;
- 740,000 vehicles registered in Ireland; (national fleet ~ 2.5m);

2.3.22 Firstly, the architecture of an ORT system is such that the individual toll points which capture 'toll transactions' are remote from the back office where the transactions are processed and billed. This means that it is feasible to connect numerous toll points to a single back office operation. This is the basic configuration of the current city congestion charging schemes in cities such as Stockholm (with 17 toll / charging points) and London (with approx. 116 toll / charging points). This provides the possibility to deploy a single national free-flow tolling scheme with numerous locations without the necessity for additional landtake, toll plazas and accommodation, all of which are necessary for conventional tolling.

[5] CILT Presidential Address, P Mallee, CMILT, 29th October 2009.

2.3.23 Secondly, interconnected tolling locations or "multi-point free-flow tolling" provide a much more robust platform to facilitate the type of tolling / charging which is necessary to manage demand on the network. For example, the ability to charge variable prices for different times of day and / or depending upon other factors such as levels of congestion and for providing distinctive pricing for strategic traffic or HGVs is simpler to coordinate and manage with a centralised back-office.

2.3.24 Globally within the road transport sector it is noticeable how many other countries are grappling with the same challenges of how to get the most out of the existing networks for the least cost, as well as how to fund existing and future infrastructure. It is therefore unsurprisingly that many are considering the same range of solutions including tolling and road user charging. For example, South Africa and Portugal are two jurisdictions currently moving forward with ambitious plans to deploy free-flow multi-point tolling on their national networks.

2.3.25 Additionally, some US States[6] (including Minnesota and Oregon) are leading the way in terms of operating and trialling tolling and road user charging based on congestion pricing on the network and as a "vehicle miles tax" (VMT). It is interesting to note that the main driver in the US is the need to generate sustainable revenues for funding infrastructure, which differs in many ways from the economic language used in Europe (i.e. "*the internalisation of external costs*") to promote the same solutions. This difference may be because US analysis has identified a worrying 'hole' in fuel taxes as well as a heightened focus on global climate change and the need to reduce carbon footprints.

2.4 Conclusions

2.4.1 The discussion set out above therefore points towards a number of basic principles which support the consideration of network wide tolling on the national road network. In summary, the following points are relevant:

- That tolling represents a progression towards a 'User Pays' principle for funding of the road network. It differs from fuel taxation in that it will allow a premium to be applied for roads of higher quality (motorways and high quality dual carriageways). This is similar to other forms of transport such as rail and sea where higher standard services are subject to a higher user charge;
- That tolling can provide a useful means of network management in areas that are subject to traffic congestion. It can reduce the level of discretionary trip making, and lead to changes in travel time or destination which can reduce the level of delay to residual users; and
- That recent development in tolling technology have allowed more efficient toll collection systems which reduce delay to vehicles subject to charges. Ireland is currently leading the way in the delivery of interoperability between different toll operators.

[6] The National Evaluation of a Mileage-based Road User; Jon G. Kuhl and Paul Hanley, The University of Iowa; Symposium on Mileage-Based User Fees, April 2009.

2.4.2 It is therefore concluded that the implementation of a national tolling programme, prompted by Government in the context of revenue generation for funding infrastructure maintenance, will support the ability of the National Roads Authority to fulfil its function of providing and maintaining a safe and effective road network which contributes to economic competiveness and environmental goals of the State.

3. Network Tolling Strategy and Plan

3.1 Introduction

3.1.1 In order to progress with the recommendations to investigate opportunities for additional tolling recommended within the Department of Finance report, the NRA commissioned consultants to undertake a feasibility study to examine the options set out below in more detail:

- **Option A** - Raising toll rates on existing facilities;
- **Option B** - Introducing new tolls on existing roads; and
- **Option C** - Introducing new tolls on new roads.

3.1.2 The revenues referred to are, in all cases, gross revenues from which VAT, rates and operating costs are to be deducted. The indicative toll charges mentioned refer to car charges. It is assumed that charges will also apply to other vehicle classes, except those currently exempted (e.g. emergency vehicles).

3.1.3 This study involved consideration of the three options and examined potential issues associated with introduction of tolling on routes which are currently tolled and untolled. In urban areas, the investigation focussed on the issue of how tolling can be delivered in a manner which accounts for the complexity of the road network and the short distances between adjacent junctions, which can hinder the introduction of tolling (as well as being generally detrimental to service levels).

3.1.4 In identifying proposed toll locations, a number of principles have been established to assist with the selection of options. The principles set out in Table 3.1 below reflect policy objectives and other influences set out in Section 2, and additionally consider the practical requirements associated with the introduction of tolling points.

- Tolls are most applicable on premium roads with a good level of service (motorway or high quality dual carriageway), where fuel taxation does not capture the additional value to users of those roads;
- In order to encourage mode shift where possible, tolls should not be considered on corridors with poor or no public transport services;
- Tolls should only be levied where alternative routes exist for motorists;
- Tolls should be applied in an equitable manner, which means:
  - In uncongested areas, tolls should broadly be related to the distance travelled;
  - In congested areas, tolls may additionally be adjusted to manage demand through differential charging by time of day; and
  - Base tolls for distance based charging should be within a comparable range across the country prior to the application of any supplementary charges including, for example, the environmental charging required by EU regulations for HGVs.
- Other than in exceptional circumstances, tolls should be nominal, to the extent that they will not lead to excessive diversion onto unsuitable roads; and
- That diversion should not cause excessive traffic through environmentally sensitive areas.

Table 3.1: Principles for identifying suitable tolling locations

3.1.5 The analysis also concluded that the approach to tolling may be fundamentally different for urban and rural areas. Urban tolling brings with it a host of additional requirements, which include the requirement to avoid congestion as a result of the tolling process, and the impact on diversion given the relatively high number of alternative routes available.

3.2 Planning and Implementation Considerations

3.2.1 Prior to presenting the proposals for each of the three options it is important to highlight a number of general overarching questions which should be considered as well as to highlight and discuss some important assumptions which underpin this tolling strategy.

3.2.2 If the NRA are directed by the Minister of Transport to implement all or a significant proportion of the options presented within this report (i.e. Options A, B and C), this would represent a significant programme of work. As such we would consider and review certain aspects (set out below) at a programme level, rather than a project level.

- **What is the Preferred Business Model - and should it be different for different tolling options and work packages ?**

  This is probably the most critical area and one of the most influential areas in terms of creating new tolling schemes which will be efficient and effective over the long term. The preferred business model is critical as it can delay the development of the other work streams which are dependent on it (e.g. software development). The business model can vary from a simple model for a conventional barrier toll plaza (enabled for ETC) to a more complicated version for a fully electronic multi-point system on a particular road corridor (e.g. the M50) as this will, for example, require the definition and agreement of a number of elements including the customer management and enforcement strategies.

  Given that the preferred business model will drive the operating regime and therefore the operating costs it is important that the model develops simple and efficient business processes for managing regular and irregular users alike. When one considers the analysis of the customer statistics from the M50 toll road which shows that 5% of the customer base (annually) account for over 50% of journeys made it is clear that unless the business model focuses on both customer types the operating regimes could be very expensive.

  There are also a number of questions to address at the early stages including, for example, what is the policy for fuel efficient vehicles and electric cars as well as for motorbikes, freight (HGV) traffic and heavy / regular users including for instance the application of a daily maximum limit for regular users.

  In addition, the classification of vehicles is central to any tolling business and the current classification arrangements should be reviewed to assess whether they can be simplified prior to introduction of a national tolling programme with the objective of simplifying the charging structures for users which would in turn simplify the classification systems and technology required at the toll points.

- **What is the preferred solution architecture and technology - and should it be different for different work packages ?**

  As stated earlier in this report, there are two main options available to the NRA for new tolling schemes and they are conventional 'barrier' plaza tolling and free-flow 'barrier-free' tolling. The option of satellite tolling is not considered in the short to medium term (although it is being promoted by the EU in particular for HGV charging). Obviously with the successful deployment of barrier-free tolling on the M50 Motorway the attractiveness of this option increases due to the reasons explained earlier in Section 2.2 (i.e. it is relatively straightforward to connect numerous toll points to a single back office operation and "multi-point free-flow tolling" provides a more robust platform to facilitate the type of tolling / charging for managing demand on the network). In addition, the significant number of existing motorists who are already signed up with tolling accounts (circa 740,000) means that launching new ORT facilities on the network would be less challenging logistically than it was when eFlow was launched.

  Nevertheless, while the economics, capital costs and environmental credentials of barrier-free tolling appear attractive there is still an open question on the cost of operations for barrier-free tolling (particularly in the case where the application is to be deployed with a limited number of toll points which is the case today with the M50 operation) which may mean that in some limited circumstances a conventional tolling solution would make more financial sense.

  Therefore while we are reasonably convinced that the benefits of barrier-free tolling mean that it would be the chosen solution, and that there are far greater efficiencies available using this type of technology, this will need to be evident from the business case for the proposed packages.

  Additionally, the development of a national centralised tolling back office service into which new tolling points delivered by separate suppliers with separate contractual arrangements could be connected is something which is very attractive, due primarily to the significant efficiencies to be gained by adopting a centralised transaction management and customer care approach.

- **What is the optimum phasing for delivery of individual Work Packages ?**

  While arguably the full tolling programme (all work packages) could be implemented in a 'big bang' approach (akin to the plans for Portugal and South Africa which plan to launch new schemes with approx 30 to 40 toll points in one go) there are more persuasive arguments for organising the delivery programme on the basis of a rolling programme. This would require a smoother resource profile (both internally and externally) as well as enable the NRA to deliver certain packages more quickly due to the less complicated and less risky delivery schedule - thereby switching on the revenue stream more quickly.

- **What is the preferred Corporate and Administrative framework ?**

  This is a question to be assessed prior to establishing the necessary corporate, administrative and organisational arrangements to manage a new significant national 'public sector' tolling business. International practice based on our knowledge of other jurisdictions with significant 'public sector' tolling or road user charging infrastructure indicate a range of choices from the current model

with slim public sector managing large private sector organisations (and resources) to larger public sector managing slimmer private sector organisations (and resources).

We have also observed that various jurisdictions have changed their administrative and corporate models over time with both the Swedish and Austrian road authorities migrating towards 'insourcing' the majority of their public sector tolling operations and the State of Queensland which has recently expanded their barrier-free tolling operations on their network moving in the opposite direction with plans to sell their public sector tolling operations to the private sector.

- **What are the preferred Procurement Options and Contractual Models ?**

  The NRA has significant recent experience of procuring outsourced service contracts with operational payments and performance regimes and would therefore propose to develop suitable delivery and service type contracts. While potential suppliers are still relatively inexperienced in the ORT sector there is significantly more experience now than there was even two years ago. That said the price differential in the market, particularly for back office systems, can be significant between suppliers.

  As we have seen in the past, the software development, testing and mobilisation stages for any significant ORT schemes will require significant resources and adequate monitoring with appropriate risk share between the NRA and contracting parties to ensure that performance issues are well managed.

  As part of this we need to determine intended linkages between the individual work packages (both operationally and technically as in the case of a national system). Obviously more standardisation between work packages will bring efficiencies.

- **What are the implications for the NRA in relation to the existing PPP companies ?**

  The current suite of PPP contracts contain provisions which allow the NRA to make changes to the individual toll schemes on each PPP toll road. The contracts also ensure that the NRA must compensate the PPP company for any changes which negatively impact the PPP company's revenue stream. It is most likely that these provisions would apply in the case where tolls are raised on existing facilities (i.e. Option A) were revenues to be impacted, although they could potentially apply to new toll points (i.e. Options B and C) if new schemes impacted revenue levels on the PPP roads.

- **What do we need to do to ensure that the Tolling Plans comply with existing and future National and European policies ?**

  One of the main objectives for any nationwide programme of tolling is that the models can easily accommodate key EU charging and tolling concepts including the existing EETS and forthcoming HGV charging.

  At this stage the full set of requirements are not fully defined therefore we will need to be mindful of this and closely monitor the emerging regulations in this area.

- **What is the long term strategy with regard to Interoperability Management:**

  One of the main characteristics of the Irish road tolling environment, and indeed benefits for motorists, is the fact that all tags are interoperable on all toll plazas on the network. Any new tolling programme would obviously need to support and promote interoperability and ETC across the network.

  Specifically there are question regarding the existing interoperability business model regarding who funds interoperability in the new world?; how do we accommodate non Irish / EU Tag Providers?; and what role, if any, does the NRA want to play in terms of tag distribution and management.

  The future framework should also focus on arrangements regarding the services provided by Independent Tag Providers in the market from a procurement and competitive standpoint. Additionally, there is potential to integrate the current IEA operation and infrastructure directly into a new national system.

3.3 Option A - Raising Toll Rates on Existing Facilities

3.3.1 As discussed earlier, the roll-out of the new motorway network has been accompanied by the introduction of new toll points across the network. With the exception of Dublin Port Tunnel and the M50 eFlow operation, the majority of the new toll points are incorporated within the PPP roads.

3.3.2 The existing toll schemes range in scale, complexity and toll levels charged, and hence it is difficult to draw broad conclusions which attempt to predict responses to toll increases at any site. In general, toll levels (with the exception of the Dublin Port Tunnel during peak periods) are set at nominal values which are affordable to the large majority of road users, and represent good value for end-to-end traffic movements. It is for this reason that retention rates on the tolled routes are at or close to 100% for those inter-urban routes that have been observed[7].

3.3.3 For the purposes of assessing Option A, toll payments were assessed on a charge per kilometre basis to establish the range of charges as a function of the length of schemes.

3.3.4 Establishing a 'per kilometre' charge indicates that the majority of the current toll rates are in the region of 7 to 18 cent with an average of 10 to 12 cent per km. While such an exercise is not perfect, it is useful in demonstrating the potential to examine harmonising the charging structure in more detail, either per toll point (a consistent rate for vehicles at all toll points across the network), or per km (where the charge payable directly reflects the distance travelled). It also provides an indication on whether current users feel that the current tolls represent value for money, although caution is required in this respect as it is likely that many users will consider that the current toll is for the use of the full corridor rather than for the PPP section only.

3.3.5 In either case, it is important to consider the potential impacts of diversion as a result of increasing tolls at any location, and hence toll charges would be required to remain within nominal values such that the level of diversion can be successfully managed.

[7] *NRTMS - Modelling of Toll Responses : AECOM 2010*

3.3.6 In order to get a better understanding of the current response to existing toll points, a series of licence plate number (LPN) matching surveys were undertaken to establish diversion around three toll points (M1 Drogheda, M4 Kinnegad and N25 Waterford). The findings of these surveys demonstrated variation in diversion rates across the individual toll roads. For example, on the M4 light vehicle diversion rates were highest at about 4%, with much higher heavy vehicle diversion rates in the region of 10% and 14% across the day. On the M1 and N25, diversion rates are much lower, with results of no more than about 2% for all vehicle types.

3.3.7 It is therefore sensible to assume at this stage (i.e. in advance of further modelling) that existing diversion rates for light vehicles are low, and hence users generally perceive that the tolled roads are worth paying for.

3.3.8 Given that heavy vehicle diversion rates are higher, the study focused primarily on the potential for tolling increases being applied to light vehicles only. Additionally, the mechanics for changing HGV charges is more complicated given the regulations for charging of Heavy Goods Vehicles (SI No. 87 of 2009) and the emerging draft HGV directive discussed earlier in Section 2.2.

3.3.9 The findings from the analysis demonstrate that at nominal increases in the toll level the level of diversion is expected to be minimal, with only limited reduction of demand resulting from an increase. It is noted that these modelled responses do not include the effects of corridor switching (e.g. switching from the N4 to N3, or N1 to N2) or indeed mode change that might arise as a result of the increases.

3.3.10 The analysis also suggests that a gross revenue increase in the region of €35 to 40m per annum could be achieved through an increase in existing toll levels by an increase of approximately 50% of toll charges at all locations which would equate broadly to an increase of €1.00 (excluding the M50 and Dublin Port Tunnel). While the costs associated with such an increase are likely to be modest, we need to be mindful of any impact on toll revenues for PPP companies (discussed earlier in Section 3.2.2).

3.3.11 It is not recommended or proposed to progress with any increase of tolls at existing locations (i.e. Option A) without examining and agreeing the basis for the broader strategy for additional tolling across the network and in particular with regard to Option B (described below). This is because to do so could result in an equity differential which would not accord with the principles set out earlier in this report.

3.4 Option B - Introducing New Tolls on Existing Roads

3.4.1 There are a number of distinct packages under this heading which were reviewed in line with the principles set out earlier in this chapter including:

- **Option B1** - M50 Multi-point Tolling;
- **Option B2** – Greater Dublin Area;
- **Option B3** - Cork City & Region; and
- **Option B4** - Other Route**s.**

Option B1 - M50 Multi-Point Tolling

3.4.2 The M50 motorway has been tolled since it's construction in the early 1990s with the tolling of the bridge spanning the River Liffey valley by NTR, a private company who financed the construction of the bridge / crossing. As part of the overall M50 upgrade project (which included additional lanes and freeflow junctions) NTR's tolling concession was purchased by the State in 2008 and the NRA then replaced the conventional WestLink plaza with a barrier-free operation in August 2008.

3.4.3 There are a number of opportunities given the current tolling arrangements due to the fact that only about a third of the trips which are made on the M50 motorway today pay a toll (i.e. drive on the tolled section between Junction 6 and 7). This is because the motorway is being used as the 'hub' to connect to the radial interurban 'spokes' rather than as strategic corridor which means in practice that most journeys are shorter rather than longer. Recent analysis concluded that about 90% of journeys on the M50 travel less than 20km (i.e. half the route).

3.4.4 This situation prompts questions regarding i) equity (i.e. why do the drivers using the northern sections pay a toll while the drivers using the southern sections do not ?), ii) financial effectiveness (i.e. is it effective for only 30% of users to contribute financially towards a road which the Exchequer has spent €1bn upgrading ?) and iii) demand management (i.e. how will the NRA manage demand on this strategic corridor and protect future levels of service with a single toll point ?).

3.4.5 In order to broaden the contribution beyond those users who currently travel between junctions 6 and 7 and to improve the level of demand management on the M50, it is therefore being proposed to migrate from the current single point toll to a system of multiple interconnected toll points. It is proposed for equity reasons that future maximum tolls for a significant journey on the M50 (i.e. combined single tolls from multiple toll points) would be similar to the current rate per kilometre, with a lower toll being charged at each individual location.

3.4.6 Specifically this would also mean lower toll charges at the current toll point. It is also proposed that differential charging would continue to apply in the form of lower charging for vehicles equipped with on-board-units ('tags'), with the differential increased to reflect the cost differences.

3.4.7 The feasibility assessment highlighted that a system with between three and six toll points, each charging a toll of €1.00 to €1.50 would be preferred (possibly with a trip 'cap') as it would lead to limited levels of traffic diversion, capture the majority of the vehicles using the road to address and generate additional gross revenues in the range of €50m to €70m annually (which would equate to total gross incomes on the M50 in the order of €140m to €160m).

3.4.8 Based on the feasibility work on this option a number of key findings are outlined below:

- That different sections / links on the M50 have different levels of sensitivity to charging, with potentially high diversions occurring as charges are imposed on certain links;
- The M50 is 42 km in length and the current average trip length is 15km. A useful starting point will be the imposition of an average payment of say €2 for a distance of 15km (around 13 cent per km), to promote equity amongst all users of the M50. This would equate to a charge in the region of €5 for use of all sections of the M50, but a trip 'cap' of less than could be applied;
- That a lower number of tolling points will require a higher charge per tolling point to achieve the charge of €2 per 15km, with higher individual charges leading to higher levels of diversion;
- The cost of capturing and processing transactions will dictate a minimum charge per tolling point that is necessary for a sustainable business case;
- The optimum locations will depend on whether the agreed approach focuses on revenue maximisation or market maximisation (i.e. attempting to capture the majority of trips at least once on the M50 to ensure equity);
- Differential pricing at different tolling points can improve the business case; and
- Inclusion of the costs of delay due to diversion will significantly influence the modelling exercise and final outcome as increases in congestion on the local network will makes diversion less attractive.

3.4.9 Additionally there needs to be further consideration on the integration of the charging of motorists using the M50 and also the routes indentified under Option B2 below (the radial routes in/out of Dublin area. This should involve assessment of 'capping' or reducing daily toll charges for use of the roads in this area. Note that proposals on capping will be subject to EU regulations in this area which specify certain rules for discounting.

Option B2 – The Greater Dublin Area

3.4.10 The major interurban radial routes connecting with the M50 are not currently tolled within a thirty kilometre zone of the M50, which means that the majority of road users do not currently pay tolls on the inter-urban routes leading into the Dublin Area. The only exception to this is the M3 toll point at Pace which was recently opened which is located at the entry to the built-up area of Dublin City.

3.4.11 It is feasible to introduce comparable tolls on the other radial routes in locations which would satisfy the principles outlined earlier, in order to capture traffic entering the environs of the city.

3.4.12 In addition to providing a revenue stream for network maintenance, this approach to tolling could also provide a strong demand management function by promoting mode shift of users to the radial public transport networks and services (i.e. bus and rail) as well as ensuring a higher level of service for residual users on the network during the peak periods.

3.4.13 In order to reach these conclusions it was important to understand behavioural responses to new tolls on the network and the modelling developed as part of the study into behavioural responses played an important role in this. This assigned traffic to the tolled and untolled route on the basis of generalised cost, with an additional 'motorway bonus' or 'route quality factor' used to reflect the natural preference of drivers to stay on the higher quality road and resulted in the identification of number of locations along the following routes M1, M2, M4 M 7 and N11 where additional point tolling could be introduced based on the following criteria:

- Toll charges to be introduced on network prior to traffic entering built up area; and
- Toll charge to broadly equate to existing average toll rate of approximate 10c to 12c per kilometre as discussed earlier in Section 3.3. (i.e. for €1.30 toll this required a total carriageway length greater than 13km). In practice this demonstrated that new toll charges would equate to the current M3 Pace toll.

Scheme	Proposed Location	Total Carriageway	Nominal Toll Charge	Cost per/km
M1	North of Lissenhall Jcn	26.8 km	€1.30	€0.05
M2	Ashbourne Bypass	15.9 km	€1.30	€0.08
M4	South of Leixlip	23.1 km	€1.30	€0.06
M7	Naas Bypass	26.3 km	€1.30	€0.05
N11	South of Kilmacanogue	10.3 km	€1.30	€0.13

Table 3.2 – Option B2 Assessed

3.4.14 Further examination and assessment of the diversion rates under various scenarios concluded that the introduction of a toll point on the radials entering the built-up area would lead to the diversion rates of less than 10%, with the exception of the N2 which is expected to be slightly higher. Therefore, it is considered that the introduction of control measures which reduce the level of access onto the radial routes for short distance trips from within the built-up areas would also be required to reduce the likelihood of traffic diverting off the radial route in order to avoid the toll. A lower diversion rate for heavy vehicles was predicted which reflects the higher value of time associated with this type of road user.

3.4.15 It is estimated that this option could generate an increase in gross toll revenues in the order of €100m to €120m annually, although some further work is required to understand diversion effects and price sensitivity as well as to examine the requirements for integration of charging for users with Option B1 (M50 multi-point tolling).

Option B3 - Cork City & Region

3.4.16 The road network in Cork is such that the introduction of a network of single point tolls (or a regional multi-point system) in accordance with the principles listed earlier is not practical. From an examination of traffic flows in Cork City, it is evident that a high proportion of traffic on national roads feeds through the Jack Lynch tunnel, which is currently approaching capacity. As such, tolling the tunnel itself emerges as a potential option as it would capture a reasonably high level of road users of all national roads in this area and would assist in managing future demand in the tunnel and the surrounding network.

3.4.17 It is estimated from these initial investigations that a toll charge of €2.00 would result in gross revenues in the region of €30m to €40m annually, although some further work is required to understand diversion effects and price sensitivity.

Option B4 - Other Existing Routes

3.5.1 As part of this option, we also investigated the feasibility of introducing toll points on other parts of the network based on the principles outlined in Section 3.1 which resulted in the identification of three further locations on existing routes.

3.5.2 The locations have been selected on the basis that the diversion potential is considered reasonably low and that road layout is capable of providing a high level of service.

Scheme	AADT (Vehs)
N18 Ennis Bypass	9,000
N9 Carlow Bypass	9,000
N11 Arklow Bypass	18,000

Table 3.3 – B4 Options Assessed

3.5.3 It is anticipated that the introduction of toll points on these routes could result in gross revenues in the order of €15m to €20m annually, although some further work is required to understand diversion effects and price sensitivity.

3.5 Option C - Introducing New Tolls on New Roads

3.5.1 In general within the Options covered under A and B the bulk of the existing motorway and dual carriageway network has been assessed therefore opportunities for tolling new routes is based on assessing projects which are in the current planning 'pipeline' and relate to strategic enhancements to the motorway and dual carriageway network as set out in the table below.

3.5.2 The potential for tolling new or upgraded infrastructure requires consideration and management of junction provision and an understanding of how the schemes would fit in with the high levels principles set out earlier in this report.

Scheme	Status	Forecast AADT
N17 / N18 Gort to Tuam	Approved – in procurement	11,100
N11 Arklow Rathnew	In procurement	18,000
Galway City Outer Bypass	Not Approved – in planning	-
N20 Croom Limerick	Not approved -	12,300
N20 Cork Mallow	Not approved	16,800

Table 3.4 – C Options Assessed

3.5.3 The tolling proposed on the route sections for N17 / N18 Gort to Tuam (scheduled to open 2013) and N11 Arklow to Rathnew (scheduled to open 2014) would not impact or alter the approved PPP schemes. It is envisaged that NRA would procure tolling of these routes as part of a national centralised tolling operation with all toll income passing directly into NRA coffers.

3.5.4 It is anticipated that the introduction of toll points on the N17 / N18 Gort to Tuam and N11 Arklow to Rathnew sections of the network could result in gross revenues in the order of €10m annually.

3.5.5 The tolling of the three other routes listed above which are not yet approved could reasonably be expected to result in gross revenues in the order of €15m to €20m annually for the three routes.

3.8 Summary

3.8.1 The toll incomes for each option are outlined below in Table 3.5. Income is reported as gross figures and should be considered as budgetary figures for planning and decision making purposes only.

Options Work Package	Summary Details	Indicative Annual Gross Incomes (€m)
Option A - Raising toll rates on existing facilities	Increase toll charge by €1.00 amount at all existing toll points on national roads	**€35 - €40m**
Option B - Introducing new tolls on existing roads	Includes sub-options B1 to B4;	**€195 - €250m**
B1 - M50 Multi-Point Tolling - 4-6 toll points to approximate distance-based charging with nominal tolls		€50 - €70m
B2 - New Charges – GDA - introduce nominal tolls on key radial roads approaching Dublin (M1, N2, N4, N7 and N11)		€100 - €120m
B3 - New Charges – Cork - introduce standard toll on Jack Lynch Tunnel		€30 - €40m
B4 - New Charges – Introduce standard tolls on 3 routes (N18, N9 and N11)		€15 - €20m
Option C - Introducing new tolls on new roads	Introduce standard tolls on a number of new routes nationally	**€10m**
Total Annual Gross Toll Income		**€240 - €300m**

Table 3.5 – Indicative Annual Gross Incomes Estimates

3.8.2 The gross income figures are based on an number of assumptions which will require further clarification at a later stage as part of the modelling and business case for new toll schemes including, for example, toll charging policies (e.g. exemptions, application of maximum daily toll charges when integrating options such as B1 and B2), the actual toll tariffs, and traffic and diversion levels.

3.8.3 For the purposes of the feasibility study we have assessed and refer to 'standard' and 'nominal' tolls which can be defined as follows:

- 'Standard' tolls equate to current average toll rates charged today on the majority of toll points - in the region of €1.80 to €2.00 for a passenger car.
- Nominal tolls are less to reduce diversion or where the corridor maybe longer and are in the region of €1.00 to €1.50 for a passenger car.

3.8.4 In terms of assessing the likely range of net income deriving from these additional tolling schemes there are a number of factors to consider including the application of taxes on public sector tolling (such as VAT and Local Authority rates) which are to the benefit of the State, as well as assumptions on toll operating costs, customer types and charges, compliance rates and efficiencies of scale which will be achievable by pursuing a policy of centralisation, standardisation and simplification for all schemes nationally.

3.8.5 With this in mind it is estimated that the gross figures should be reduced in the region of 25% to 30% for taxes and 15% to 30% for operating costs which would result in a range of net incomes in the region of €96 million to €180 million on an annual basis.

3.8.6 In the case that the NRA are directed to commence with a significant programme of additional tolling, it is considered that the implementation of a national centralised system would be more appropriate as it would be much more efficient and the expected range of operating costs would be towards the lower end of the scale (i.e. towards 15%).

	Range and Estimates			
Category	**Min (€ million)**		**Max (€ million)**	
Gross Incomes (range)	**€240m**	**€240m**	**€300m**	**€300m**
Operating Costs (range)	*15%*	*30%*	*15%*	*30%*
	- €36m	**- €72m**	**- €45m**	**- €90m**
Taxes (VAT & Rates) (range)	*25%*	*30%*	*25%*	*30%*
	- €60m	**- €72m**	**- €75m**	**- €90m**
Net Incomes to State (less operating costs)	**€204m**	**€168m**	**€255m**	**€210m**
Net Incomes to NRA (less taxes and operating costs)	**€144m**	**€96m**	**€180m**	**€120m**

Table 3.6 – Annual Net Tolling Income – Estimated Range

4. Next Steps

4.1 Introduction

4.1.1 In order to progress with additional tolling schemes the NRA require direction from the Minister of Transport as to favoured options, and (indicatively) the gross toll revenue to be raised. Once this is in place the NRA will commence with the initial stages of the delivery phase which will initially involve organising and prioritising schemes into a manageable and deliverable programme.

4.1.2 Section 4.2 below sets out the key steps and an indicative programme with timescales involved as well as the key stages for each individual project (e.g. multi-point tolling). Section 4.3 below sets out the critical work streams involved.

4.1.3 One of the most critical aspects which should be highlighted upfront relates to the statutory process to be followed in introducing new toll schemes which requires development of toll schemes and bye-laws both of which are subject to consultation, review and oral hearings.

4.2 Planning & Implementation Framework

4.2.1 As shown in Figure 4.1 below, the next step following approval is to complete a programme scoping study and tolling plan to establish the main programme characteristics and tasks (e.g. marketing and communications) as well as to define the scope, location and charges for each individual project with the objective of promoting efficient and effective delivery.

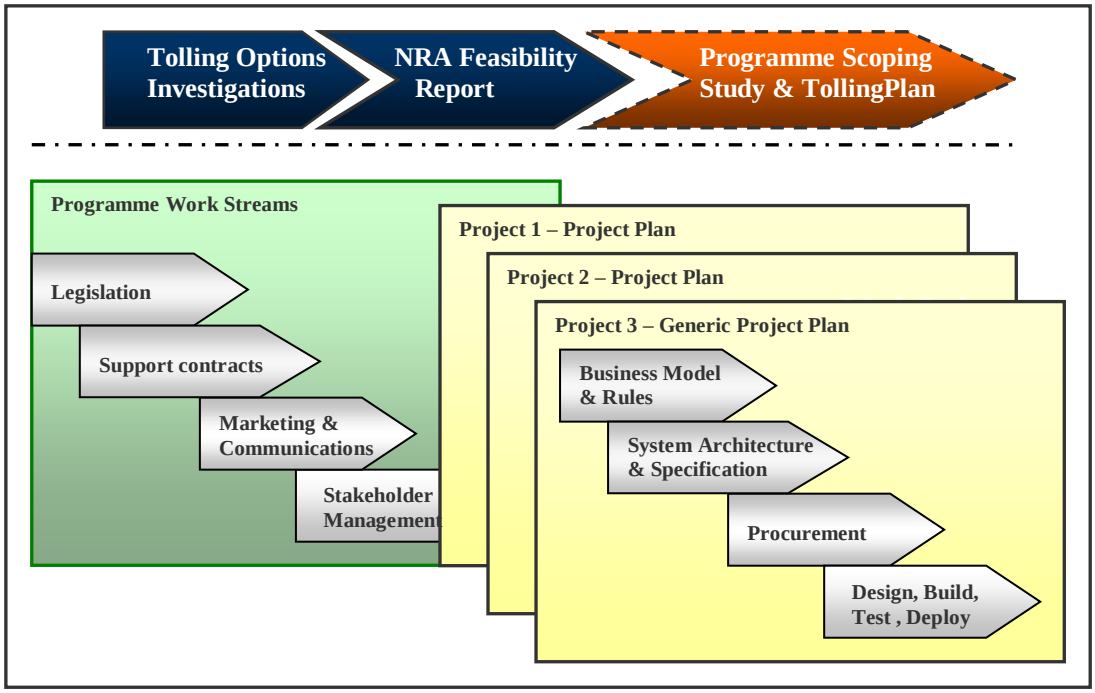


Figure 4.1 High-level Planning and Implementation Framework

4.2.2 The programme scoping study (including outline business case) will address issues which will determine the characteristics of the overall programme and of the

individual schemes including common components which require to be developed for all work packages such as a common procurement model / framework. The accompanying tolling plan will include a high level scope for each scheme including locations, indicative toll charges and technology considerations.

4.2.3 In terms of programme, there are various timescales required for the delivery of each option, as set out in Table 4.1 below.

	Options Work Package	Stages	Indicative Timescale
Ministerial direction in principle			**Start**
Programme Scoping Study and Tolling Plan to Department of Transport			**+ 4 months**
Ministerial direction to implement tolling			**+ 6 months**
Option A - Raising toll rates on existing facilities			
	Revenue stream by mid 2012	New Toll Schemes	+ 4 months
		New Bye Laws	+ 4 months
		Approvals (Board) and Contractor Implementation	+4 months
		Total Project Timescale	**+ 12 months**
Option B - Introducing new tolls on existing roads			
	B1 - M50 Multi-Point Tolling	Preparation of Specification Documentation	+ 3 months
		Production & Testing	+ 18 months
	Revenue stream by mid 2013	New Toll Scheme	+ 4 months
		New Bye Law	+ 4 months
		Approvals (Board & potentially EU)	+4 months
		Total Project Timescale	**+ 24 months**
	B2 - GDA – Radial Routes	Preparation of Tender Documentation	+ 6 months
	B3 - Cork - J Lynch Tunnel	Procurement Phase	+ 6 months
	B4 - 3 Routes	Production & Testing	+ 18 months
		New Toll Scheme	+ 4 months
	Revenue stream by early 2014	New Bye Law	+ 4 months
		Approvals (Board & potentially EU)	+ 4 months
		Total Project Timescale	**+36 months**
Option C New tolls on new roads		Revenue streams in line with individual project delivery timescales	**Various**

Table 4.1 Indicative Programme

4.3 Critical Work Streams

4.3.1 Following the programme scoping study and tolling plan approval we would engage with external programme and project management resources to assist the NRA team with the management of the programme. This will involve consideration of a number of critical work streams as set out below.

- **Preferred Business Model and Business Rules**: as discussed above this is probably the most critical of the work streams. The preferred business model will drive the business rules which tend to cover a number of elements including, customer processes which should address account types, billing and payment timeframes, methods, channels and triggers, Customer Terms and Conditions, customer and website privacy policies, data protection policies and enforcement regimes (including penalties) and violation policies.

  In addition the business rules tend to relate to specific treatment relating to types of transactions, charging, discounts and more detailed rules around account suspension and data retention periods etc.

- **Legislation – enabling & supporting:** The legislative provisions are in place, in the Roads Acts 1993 – 2007, to enable the NRA to move into the implementation phase with regard to introducing more tolling on the network. In addition the legislation is tested (although not in the higher courts) as it has been subject to scrutiny by the legal profession in the eFlow enforcement process over the past year.

  - Therefore the question is whether the future business models may propose different options by say, for example, linking unpaid tolling fines with motor tax renewal or the penalty point regime, or requiring all vehicles to have an electronic licence plate (as is the current proposal in Portugal for their new tolling schemes) and if so whether these new business rules would require specific supporting legislation.

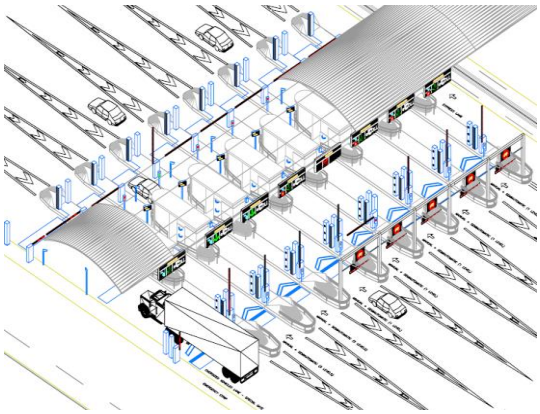
  - In accordance with the statutory process, it is envisaged that the NRA will have to prepare a new toll scheme for each work package which will be subject to public consultation. The complexity of the toll scheme will depend on consideration of additional factors including (i) registration of road users for use of the toll road, (ii) application of penalties for non compliance and (iii) application of differential toll charges for different categories of users (i.e., those with tag accounts, video accounts or no account).

  - In addition, each toll scheme requires the production and approval of a set of Bye-Laws.

- **Solution Architecture and Technology:** Once the system type has been determined as part of the programme scoping study for each work package we will need to engage in the preliminary design of the system architecture and technology. This does not need to be a detailed exercise as it is standard practice to leave the majority of the design to the suppliers / contractors but it should consider as a minimum the key functionalities and expectations on performance (e.g. an outputs based specification). One of the queries to consider for ORT systems will be whether we consider that we should migrate to front and rear plate recognition as opposed to front only. Additionally we also need to consider

the most appropriate way to procure 'open' systems so that we avoid sole dependency on single suppliers as much as is possible.

- **Site selection, land purchase and planning**: Additional land requirements will depend on the individual site requirements and the choice of technology. As discussed earlier the deployment of conventional tolling plazas will require much more significant landtake than ORT systems and this will have to be factored into both the budget and the delivery programmes.



- The siting of gantries for the ORT systems will also need to comply with the relevant planning reqirements.
- **Procurement of Tolling Systems** – decide on the contract type (e.g. Design, Supply, Operate and Maintain) term and key items including for example risks, revenue share, incentivisation, term and termination options, scope and delivery milestones:
- **Other Supporting Contracts:** In addition to the procurement of the tolling system, and marketing referred to here, there will be a number of other supporting services which the NRA will require during the delivery programme including for example technical tolling specialists with specific tolling technology expertise and electronic payment security expertise, legal advisers and financial advisers.
- **Stakeholder Management:** The introduction of new national tolling schemes will require the support of a number of key stakeholders for a variety of reasons and the establishment and management of good working relationships.
- On the public sector side this will include the Department of Transport, the Driver Vehicle Computer Services Division based in Shannon as keeper of the National Vehicle Driver File which is used by the tolling system to identify all vehicles registered in the State, the Data Protection Commissioner with regard to protection of road users privacy across a number of areas and the Courts Service with regard to the enforcement process and plan for the treatment of toll evaders / violators.
- Potentially one of the most important stakeholders will be the newly formed National Transport Agency and the Public Transport companies given the potential impact on the PT networks and services of additional tolling along certain routes. Practical and effective collaboration will be required to ensure that the opportunities and impacts from future tolling plans are understood by PT agencies and that they are ready to maximise the benefits which tolling can deliver (i.e. increases in patronage).
- There are also a number of agencies and bodies representing the road users and customer groups who we will need to engage with including for example consumer protection agencies, the freight / haulage bodies as well as the motoring sector including the AA and motoring organisations under the Society of Irish

Motor Industry (SIMI) umbrella including car rental companies, vehicle leasing associations and dealerships / garages.

- **PR, Marketing and Communications:** Experience has demonstrated that political support and user acceptance are critical factors underpinning the implementation of significant tolling / user charging schemes internationally. This underlines the importance of PR, marketing and communications activities for this type of programme and one which would requires significant resources. Given that approximately 1 in 5 adults currently use toll roads on a weekly basis today it is clear that any campaign will need to focus on all motorists nationwide and including those who use motorways least.

  While it would be naive to expect a factual debate on this topic – in particular on the debate of who should pay for the maintenance of the new infrastructure (e.g. increase in other taxes versus additional tolling) it will be critical to the success of any tolling programme to be able to contribute to and influence the debate at all levels by putting forward persuasive and understandable arguments in support of additional tolling.