National Roads Authority

Supplementary Report

M50 Multi-Point Tolling

Preliminary Implementation Plan

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Information Note: This report was prepared for the Department of Transport by the National Roads Authority with the assistance of Roughan & O'Donovan AECOM Alliance and Goodbody Economic Consultants.

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1.0 Introduction

1.1 Background

1.1.1 In November 2010, the National Roads Authority submitted a feasibility report to the Department of Transport setting out a number of options for generating additional revenue from road tolling to support future transport investment and maintenance. This feasibility report (appended to this document for ease of reference) reviewed the following options:

- **Work-package A:** Raising Tolls at Existing Facilities;
- **Work-package B:** Introducing new tolls on existing roads comprising:
  - Work-package B1: M50 Multi-Point Tolling (M50 MPT);
  - Work-package B2: Tolling Charges on Dublin Radial Routes;
  - Work-package B3: Tolling Charges on Jack Lynch Tunnel, Cork;
  - Work-package B4: Tolling Charges on N18, N9 and N11;
- **Work-package C:** Introducing new toll charges on new roads.

1.1.2 We have been requested by the Department of Transport, Tourism and Sport to develop a Preliminary Implementation Plan for the delivery of work-package B1, M50 Multi-Point Tolling, with the objective of the implementation being to generate revenue. It is recognised that any decision to introduce additional tolling will be made by the Minister rather than the NRA, and that any decision will be subject to statutory procedures.

1.1.3 The previous report highlighted that today only about a third to a quarter of the journeys which are made on the M50 are charged a toll. It highlighted that most journeys on the M50 Motorway are shorter rather than longer with about 45% travelling less than 10km and 90% travelling less than 20 km, out of the overall length of 42 km.

1.1.4 In order to develop the proposed tolling regime (i.e. proposed business model, locations and charging structure, as set out in this document) a variety of tolling scenarios with a range of toll points and locations and a range of toll charges were modelled and assessed.

1.1.5 The current estimates indicate that the introduction of Multi-Point Tolling on the M50 would result in additional net revenues of approximately €48 to €84 million per annum. This would represent additional direct tax revenues to the State of approximately €15 to €25 million and additional revenue to the NRA of approximately €33 to €59 million, in the first full year of operation.

1.1.6 The estimated programme for implementation of M50 Multi-Point Tolling, from the date of Ministerial direction to proceed, is in the region of 24 months as noted previously in the original feasibility study.

1.1.7 The estimated global budget for delivery of Multi-Point Tolling is approximately €32 million (exclusive of VAT), with the majority of this expenditure expected to be incurred during the second year of implementation.

1.2 Structure of this Preliminary Implementation Plan

1.2.1 This Preliminary Implementation Plan is structured as follows:

- **Section 2** – sets out a description of the Multi-Point Tolling project including the scope and objectives;
- **Section 3** – covers the proposed legislative framework, including requirement for new national legislation (bye-laws) and compliance with existing and emerging EU policy and legislation;
- **Section 4** – sets out the proposed tolling regimes including, for example, preliminary locations for tolling, toll charging structure (i.e. rates and vehicle classification), the proposed business model including facility for unregistered users, and systems and technology. It also sets out the proposed operational regime including interface with existing tolling operations and the existing national interoperability model; and
- **Section 5** – covers the delivery and procurement approach – including key work-streams, approvals and timescales and budgets.

2.0 Project Description (Scope and Objectives)

2.1 Scope of Additional Tolling on the M50 Motorway

2.1.1 It is proposed to extend the existing tolling regime on the M50 Motorway which is currently tolled at a single location (between Junction 3 and Junction 4) by deploying additional toll points at new locations on the Motorway to increase the coverage of the existing 'eFlow Barrier-Free Tolling system, which replaced the previous conventional toll plaza in August 2008.

2.1.2 It is intended that the existing 'eFlow' system will be expanded, as opposed to the procurement of a new system, given that this has been envisaged under the existing procurement and contractual framework.

2.1.3 Note that the tolling regime will continue to be operated to collect tolls directly from the road users for the benefit of the State. In that context, the existing contractor would be paid a fee for supplying and operating the expanded tolling systems, in line with existing contractual provisions.

2.1.4 Analysis to date indicates that the most appropriate solution will require 'open' tolling of the Motorway, as opposed to 'closed' tolling with 'entry' and 'exit' tolling, as this is consistent with the existing business model and technology.

2.1.5 It is intended that the toll charges will be related to distance travelled and will comprise of an infrastructure charge component and an environmental charge component, in accordance with existing and emerging EU legislation in this area. Additionally, consideration has been given to a daily and/or journey maximum charge for customers who register for tolling accounts.

2.1.6 It is also proposed to 'spread' the tolls to achieve a more equitable charging structure by reducing the current toll charge at the existing eFlow Toll Point (i.e. between Junction 3 and Junction 4) when introducing new toll points.

2.1.7 While the toll charges will be related to the distance travelled by vehicles, it will not be necessary and there will be no requirement to link the transactions captured by the system by a number of toll points (i.e. to attempt to calculate distances travelled), although the system will be required to accommodate the application of a maximum charge referred to in paragraph 2.1.5 above.

2.1.8 It is intended that the new tolling arrangements will be integrated legally and technically within the national system for tolling interoperability – so that existing 'tag' and 'video' tolling customers with accounts (currently approximately 750,000 vehicles) will be able to use the new tolling facilities without any need to change. The new system will also be required to facilitate future European tag customers as required, in line with existing EETS legislation.

2.1.9 The new system will consist of a number of individual toll points using free-flow (i.e. barrier-free) tolling technology designed to detect On-Board Units (OBUs) and Licence Plate Numbers (LPNs) connected to the current central 'back-office' for the management and processing of the tolling transactions.

2.1.10 It is intended that the tolling regime will apply to all vehicles using the tolled network with the exception of vehicles that are currently exempted from tolls (e.g. ambulances) on the basis of vehicle class and emissions class for HGVs (in due course and as required).

2.1.11 The business model and business rules for the new tolling regime will be similar to the eFlow's current business model and business rules in operation today on the M50, with some simplifications and amendments. It is intended that the tolling system will continue to facilitate both registered and unregistered customers with a variety of account options and convenient payment methods.

2.1.12 It is intended that tolls will continue to be discounted for registered customers with tolling accounts. For example, the current toll for a tag registered car is €2.00 and for an unregistered car is €3.00. It is not initially intended that tolls would be variable by time of day or levels of congestion, although this functionality may be requested from system suppliers for future deployment, as and when the need arises, depending on cost.

2.2 Objectives for M50 Multi-Point Tolling Regime

2.2.1 The previous report set out a number of principles reflecting the existing policy objectives which were used to assist with the development and consideration of individual work-packages. In summary these were as follows:

- Tolls are most applicable on premium roads with a good level of service (motorway or high quality dual carriageway) and where possible to encourage mode shift;
- Tolls should be applied in an equitable manner and other than in exceptional circumstances should be nominal, to the extent that they will not lead to excessive diversion onto unsuitable roads or through environmentally sensitive areas.

2.2.2 As part of preparing this Preliminary Implementation Plan, we note that ***the overarching objective is to collect additional toll revenues from road users on the M50 and to ensure that this is done in an efficient and equitable manner***. The practical objectives to be delivered are as follows:

- The tolling regime is commercially focussed and cost effective - so that the financial benefits to the State are maximised;
- The tolling regime is equitable – by charging the majority of road users across the length of the Motorway;
- The tolling regime is customer focussed and relatively simple to understand by users - as this increases tolling revenues and reduces operating costs;
- The tolling regime complies with relevant national and European policy and legislation; and
- The tolling regime is designed to facilitate network demand management requirements (e.g. variable charging by time of day).

3.0 Legislative Framework and Requirements

3.1 Background

3.1.1 Any new tolling scheme is required to satisfy a number of requirements in order for it to be legally implemented on the public road network. The four sources of legal requirements are:

- The Roads Act 1993 which establishes the Irish legal framework for charging tolls;
- The European Directive on the Electronic Tolling Systems;
- The Eurovignette Directive on charges applied to HGVs; and
- Other general EU policy on tolls and charges for all vehicles including private vehicles.

3.1.2 There are also national enforcement laws and regulations (criminal and civil) as well as a host of emerging cross-border enforcement legislation which is relevant for the purposes of establishing an effective and efficient enforcement regime.

3.2 The Roads Acts 1993 to 2007

3.2.1 The Roads Act 1993 as amended by section 271 of the Planning and Development Act, 2000 and section 3 of the Roads Act, 2007 are the principal pieces of national legislation governing tolling schemes. The legislation gives the NRA statutory powers to charge tolls in respect of the use of national roads. The Act defines a statutory process that must be followed in implementing a toll scheme. The essential elements of this process are as follows:

- A Notice must be published in the relevant area, informing the public that a Draft Toll Scheme has been prepared and indicating where the Draft Toll Scheme and Explanatory Statement can be inspected and how to make objections;
- A Notice to be served on the relevant local authorities informing them that a Draft Toll Scheme has been prepared and stating that representations may be made in writing to the NRA within a specified period;
- If objections to the Draft Toll Scheme are received and not withdrawn, the NRA shall cause an oral hearing to be held into the matters to which the objections relate. The report and recommendations of the person appointed to hold the hearing will be considered by the Board of the NRA prior to determining whether or not to adopt the Draft Toll Scheme; and,
- The NRA may adopt a Draft Toll Scheme with or without modifications or may refuse to adopt it.

3.2.2 The Act specifies that a Draft Toll Scheme and Explanatory Statement should:

- Specify the public road or proposed public road in respect of the use of which it is proposed to establish a system of tolls;
- Indicate the classes of vehicles and road users for whose use the toll road is intended;

- Indicate the classes of vehicles which, and road users who, will be charged tolls in respect of such use and exemptions;
- Include an estimate of the amounts of the tolls that it is proposed to charge in respect of the use of the toll road by such vehicles and road users;
- Include provision for various levels of default tolls (penalties) where a toll charged and payable is unpaid within specified periods; and
- Specify such other information as the road authority may consider appropriate or the Minister may prescribe.

3.2.3 Furthermore Section 57(4) of the Roads Act, 1993, as amended by section 271 of the Planning and Development Act, 2000 requires the Explanatory Statement outlining the provisions of the scheme and its purpose to include:

- Information in relation to the general arrangements for the construction, maintenance and operation of the toll road to which the scheme relates and for the payment of the cost of such construction, maintenance and operation,
- Estimates of the capital cost of the road (where appropriate) and of the capital and operating costs of tolling the road; and
- Estimates of the volume and kind of traffic that will use the road and the amounts of the tolls in respect of such traffic.

3.2.4 Following the adoption of the Toll Scheme and in exercise of the powers conferred under section 61 of the Roads Act, 1993, as amended the National Roads Authority, is subsequently required to prepare and publish Draft Bye-Laws in respect of the scheme. These draft Bye-Laws should:

- be available for inspection and available free of charge (and also available on the Authority's website at www.nra.ie). These arrangements should be publically notified along with arrangements for the making of objections in the national media;
- approved by the Board of the Authority, acting in accordance with section 61 of the Roads Act, 1993, as amended, for adoption and publication;

3.3 New EC Transport White Paper

3.3.1 The previous report covered the policy context to tolling and user charging in some detail, noting in particular the financial and environmental rationale pushing transport authorities towards the 'internalisation of the external costs of transport' across all modes. In practice this means the promotion of 'User Pays' and 'Polluter Pays' principles as part of funding and charging regimes.

3.3.2 The recently published (March 2011) European Commission's White paper entitled "Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system" provided further clear signals stating that there is increased pressure on "*resources for infrastructure funding and that a new approach to funding and pricing is needed*". The white paper recommends that other sources of funding are to be considered including "*schemes for the internalisation of external costs and infrastructure use charges*".

3.3.3 In addition, while the consequences of implementing the vision set out in the white paper have yet to be fully assessed at a national level, it is obvious that the challenge of breaking the transport sectors' dependence on oil, combined with the ambitious targets for reductions of emissions and the gradual phasing out of 'conventionally-fuelled' vehicles, will significantly reduce fuel consumption and fuel tax revenues across the EU as a whole.

3.3.4 Against this backdrop and context, and in combination with existing and emerging European legislation (covered below) it is evident that Europe is indeed at "a crossroads" and that road user charging schemes will probably be far more widely deployed on strategic transport corridors and urban areas within the next decade - for a mixture of environmental, traffic management (i.e. congestion) and financial reasons.

3.3.5 In summary, the European law outlined below requires that any new tolling arrangements in Ireland are firstly reviewed and agreed by the European Commission in the sense that they comply with the spirit and where relevant the specific requirements of the Directives in this area. Secondly that the toll charges for heavy goods vehicles should reflect the level of pollution caused by the specific vehicle (based on Euro emissions class) as well as requiring new toll systems to be capable of accepting and processing transactions by European vehicles with tags provided by approved European tag providers (known as EETS providers).

3.4 HGV Charging - Eurovignette Directives

3.4.1 As set out earlier in Section 5.1 this report, the Eurovignette Directive sets rules on the charging of heavy goods vehicles for the use of certain infrastructures (Directive 1999/62 as amended by Directive 2006/38/EC). A further new Directive (i.e. a third directive) is at the final stages of development and is being considered by the Council of the EU.

3.4.2 Directive 1999/62 has been fully implemented in Ireland by Statutory Instrument. This Directive only applies to HGVs with a maximum permissible laden weight of more than 3.5 tonnes, and its main purpose is to create a road charging regime across the EU that allows a fair system for charging HGVs across the EU. To this end it requires that tolls or user charges applied by a Member State do not discriminate, either directly or indirectly, between domestic and foreign road users. In particular:

- It must be possible to pay a user charge (i.e. a vignette type charge allowing a vehicle to use a road for a set period of time) at a wide range of outlets, 24 hours a day;
- If on board units are required to pay users charges or tolls these units must be available to all road users on "reasonable administrative and economic arrangements".
- User charges must be proportionate to the duration of use made of the infrastructure i.e. there must be a short term charge available to temporary users from outside the Member State.

3.4.3 The Directive also imposes the principles of "user pays" and "polluter pays" on Member States who introduce road charges. Tolls cannot exceed the cost of providing the road infrastructure in question, and tolls imposed on HGVs cannot exceed the

proportion of the total cost of the road that that road use by HGV's represents of total road use. The directive does allow tolls to be varied according to the level of emissions of a HGV, as measured by its "EURO" emission class.

3.4.4 While it is intended that the proposed business model for the current Multi-Point scheme be developed to be consistent with the requirements of the suite of existing and emerging Eurovignette Directives, it is likely that higher toll charges for the most polluting vehicles may not be introduced at the same time as Multi-Point Tolling due to the complexities involved.

3.4.5 That said formal dialogue and 'approval' of our plans with respect to Multi-Point Tolling with the European Commission will be required (and is expected by the Commission) during the next phase of development of this project.

3.4.6 Based on previous discussions and clarifications with the Commission we understand that it will not be mandatory to introduce full environmental charging for HGVs (where the heavy polluting vehicles pay more than the cleaner vehicles) and that we can migrate towards this in time, as long as the tolling regime does not discriminate against foreign HGVs. This is because the tolling arrangement on the M50 motorway was in place before the deadline set out in Article 7a(3) of Directive 1999/62/EC, as amended by Directive 2006/38/EC, *"...Tolling arrangements already in place on 10 June 2008 or for which tenders or responses to invitations to negotiate under the negotiated procedure have been received pursuant to a public procurement process before 10 June 2008 shall not be subject to the obligations set out in this paragraph, for as long as these arrangements remain in force and provided that they are not substantially modified.*" Further to this, recital 17 of Directive 2006/38/EC amending Directive 1999/62/EC, which we have been advised is considered crucial for the correct interpretation of Article 7a(3) of Directive 1999/62/EC as amended by Directive 2006/38/EC, stipulates that "*In order to ensure consistent, harmonised application of the infrastructure charging system, new tolling arrangements should calculate costs in accordance with the set of core principles set out in Annex II or be set at a level which does not go beyond that which would result from the application of these principles. These requirements should not apply to existing arrangements unless they are substantially modified in the future. Such substantial modifications would include any significant change to the original terms and conditions of the tolling scheme through modification of a contract with the tolling system operator but would exclude changes provided for in the original scheme. In the case of concession contracts, substantial modification could be implemented pursuant to a public procurement process. In order to achieve transparency without creating obstacles to the functioning of the market economy and public private partnerships, Member States must also communicate to the Commission, so that the Commission is in a position to give an opinion, the unit values and other parameters they intend to apply to calculate the various cost elements of the charges or, in the case of concession contracts, the relevant contract and base case. Opinions adopted by the Commission before the introduction of new tolling arrangements in Member States are entirely without prejudice to the Commission's obligation under the Treaty to ensure that Community law is applied.*" On foot of this the Commission advised that they would probably not consider the introduction of additional toll points as constituting "*a significant change to the original terms and conditions through modification of a contract with the tolling system operator*" as it is a technical measure to improve the

collection of the tolls and make the entire system more fair and that it was provided for under the original / existing contract. Therefore, such change should not be regarded as a "new tolling arrangement" or a "tolling arrangement substantially modified".

3.5 Electronic Tolling Systems Directive

3.5.1 EU Directive 2004/52 and Council Decision 2009/750/EC on the interoperability of electronic toll systems imposes certain rules on the choice of technology for toll systems, to promote interoperability of the systems and mandates the use of certain standards for equipment and processes.

3.5.2 This Directive and Decision also set out the requirements for the European Electronic Toll Service (EETS). EETS is to be available for HGVs and vehicles allowed to carry more than nine passengers by 2012, and for all vehicles by 2014. EETS will be operated by European Electronic Toll System providers, who will issue their customers with On Board Units, pay tolls to individual toll operators such as the NRA on behalf of these customers, and collect the value of these tolls from their customers.

3.5.3 Ireland was one of the first countries in the EU to migrate to the EETS style tag providers within the national tolling sector and one of the first to offer full ‘interoperability’ nationwide for all tag customers and this capability would be brought forward for any new tolling proposals.

3.5.4 The NRA is currently assessing the feasibility of implementing EETS in Ireland in line with obligations and is part of the Department of Transport’s Stakeholder group established to coordinate and monitor activity in this area.

3.5.5 While European interoperability will impose compliance costs on the tolling sector and is unlikely to have a strong business case underpinning it, it will provide financial and performance benefits as a result of standardisation in the marketplace on the technology and process side of the equation.

3.5.6 In any case and irrespective of whether the NRA move forward with Multi-Point Tolling these preparations at a national and at a network manager level will continue.

3.6 Possible Legislative Improvements

3.6.1 As part of broader research into other free-flow tolling operations we have noted a variety of legislative and enforcement options in play which could result in an improved business case for a new multi-point tolling scheme. The main options which could assist with reducing operating costs and improving yields are set out in the box below for consideration by the relevant stakeholders.

3.6.2 In the event that additional tolling schemes are approved, in particular multi-point tolling on the M50 this is a critical work-stream which would require direction and support from the Department of Transport and the involvement and assistance of other stakeholders.

- **Linking Unpaid Toll Fines to annual renewal of Car Tax and Insurance** – both Canada and Australia have legislation which prevents motorists who have outstanding toll fines from renewing their annual motor tax and insurance. This increases levels of compliance and significantly reduces enforcement costs.
- **Compliance and enforcement:**– i) the possibility of motorists being awarded penalty points for tolling offences could reduce evasion and reduce enforcement costs and / or ii) additional powers for authorities to engage in more proactive enforcement of offences such as impounding and crushing vehicles could reduce toll evasion levels and reduce enforcement costs;
- **Cross-Border Enforcement Options**:- ongoing improvement of cross border enforcement to reduce foreign evasion levels by developing efficient enforcement processes to build on the recent data exchange arrangements would assist in improving compliance levels for foreign vehicles.

4.0 Proposed Tolling Regime

4.1 Introduction

4.1.1 This section provides details on the proposed tolling regime including detail on the locations of new toll points, an outline of the toll charging structure (i.e. rates and vehicle classification) and a summary of the business model. It also provides an overview of the operating regime and systems / technology to be deployed.

4.1.2 The development of a preferred tolling regime comprising preliminary locations and a charging structure was based on detailed traffic and revenue modelling of a wide variety of scenarios so that the relationship between inputs (i.e. toll location and toll charge) and the outputs (i.e. diversion rates, toll revenues and to a lesser extent capital and operating costs) could be better understood and evaluated.

4.1.3 As such it is important to note that the preferred toll locations and toll charging structure were considered in tandem and in conjunction with an assessment of the consequences on the outputs side of the equation (e.g. diversion rates). The goal is to strike the right balance between theory and practice to ensure that any new multi-point tolling system will capture a high proportion of journeys on the motorway in an equitable manner while minimising diversion rates and capital and operating costs, ultimately resulting in maximum net yields.

4.1.4 This section also sets out an overview of the financial impact of the new tolling regime, in particular, highlighting the likely gross revenues to be collected and the scale of the reductions that are likely for taxes and operating costs and the application of a maximum charge on toll charges for registered users.

4.1.5 Note that this section sets out details on the location of new toll points and the levels of the new toll charges in order to provide an overall picture of these proposals as well as a reasonable level of detail to assist decision makers in reviewing these proposals. These proposals are neither approved nor finalised. As stated earlier there is a specific statutory process to be followed before any new tolling schemes can be implemented, and subject to Ministerial direction, further detailed work would be required to prepare a Draft Toll Scheme and Explanatory Statement.

4.2 Preliminary Proposals - Locations of M50 Toll Points

4.2.1 As shown in Table 4.1 below, the intention is to deploy an 'open' system of multi-point tolls consisting of four toll points on the M50, with additional toll points covering the slip roads at the Ballymun interchange to manage the level of diversion that would otherwise occur through the Swords area.

Identifier	Route	Location *(Tolls to apply in both directions each location)*
GDA-1	M50	Junction 4 (Ballymun) East facing slips
GDA-2	M50	Junction 4 (Ballymun) to Junction 5 (N2)
GDA-3	M50	Junction 6 (N3) to Junction 7 (N4) *(existing toll point)*
GDA-4	M50	Junction 7 (N4) to Junction 9 (N7)
GDA-5	M50	Junction 12 (Firhouse) to Junction 13 (Ballinteer)

Table 4.1 M50 Multi-Point Tolling – Preliminary Proposed Locations

4.2.2 The positioning of toll points (shown on Figure 4.1 below) on the network required detailed analysis and consideration of a variety of interrelated factors such as, for example, traffic levels, construction constraints and an understanding of the potential impacts of a proposed toll point on local traffic movements. These factors are expanded on in the bullet points below:

- Road link / section requirement and suitability for tolling – including link length and position, traffic type and levels;
- A toll point must be located some distance from a junction to allow clear separation between signage associated with junctions, and the signage associated with the toll point. This has been conservatively identified at about 3 km;
- A toll point should be located on a section of road where access is fully controlled – i.e. there are no field entrances / minor side roads close to the toll point;
- The conditions must be suitable for construction and erection of gantries, although consideration will be given to utilising existing motorway gantries where feasible;
- A toll point should not lead to high levels of diversion (as might be the case where a toll is charged for a very short length of road where an attractive untolled alternative route is available); and
- The toll point must be clear of other infrastructure such as Garda platforms, overhead power lines, emergency crossovers etc.

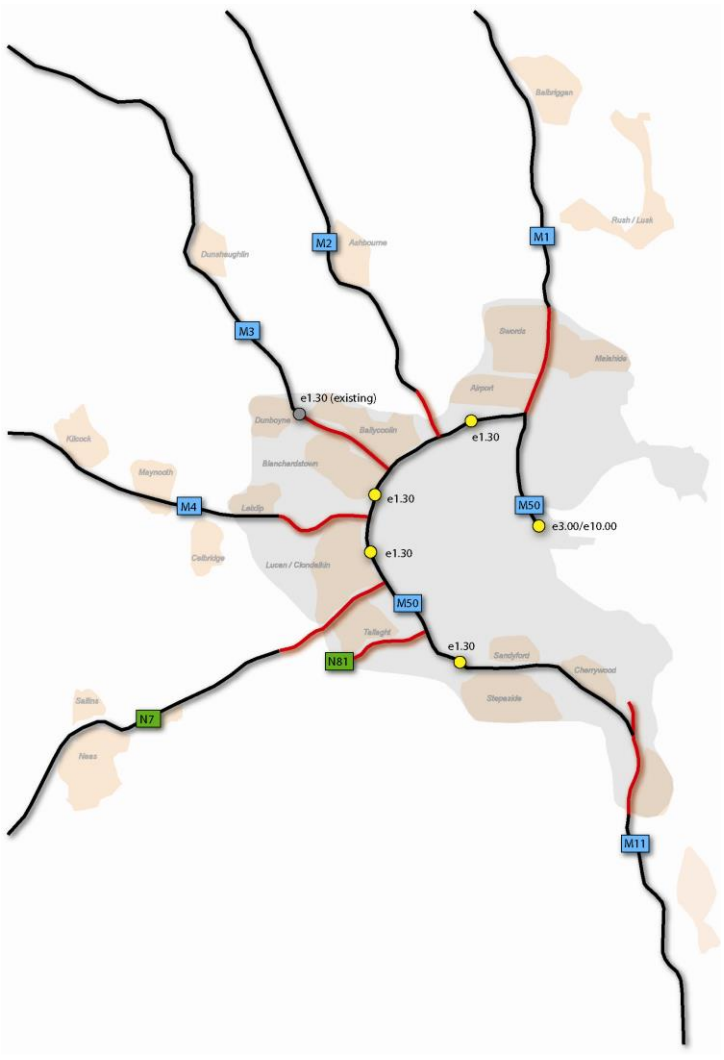


Figure 4.1 Schematic of Preliminary Proposed Locations

4.2.3 In general terms, the selection of the preliminary locations for new additional toll points has been based on an assessment of a variety of scenarios, some of which were designed to capture the highest number of journeys made on the M50 Motorway while attempting to minimise the level of likely diversion onto the regional and local

road networks. In this context it is worth noting that i) previous analysis highlighted a high proportion of shorter distance journeys on the M50 with some 45% of journeys travelling 10 km or less and 90% are 20km or less (as shown in Figure 4.2 below) and ii) that the southern end of the M50 is more challenging to toll as there are more junctions and better interconnections with the local road network in these areas.

4.2.4 In addition, the HGV traffic as a percentage of overall traffic on the M50 links calculated from the traffic surveys demonstrates that HGV traffic decreases on the southern sections of the Motorway (as per Figure 4.3 below).

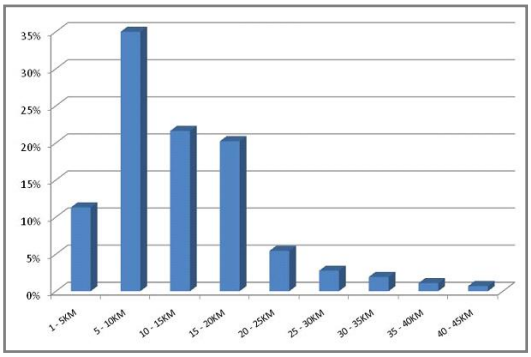


Figure 4.2 M50 Trip Length during AM Peak

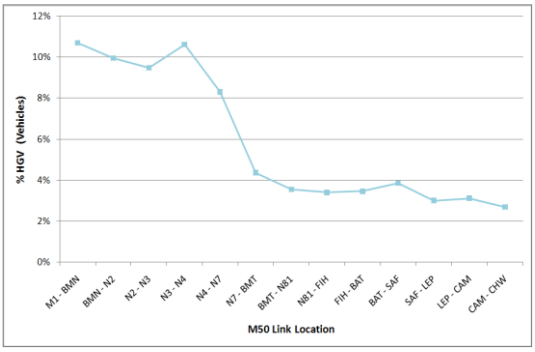


Figure 4.3 HGV% per section (Two Way Average)

4.2.5 Currently it is estimated that there are in the region of 340,000 to 380,000 individual journeys made each day on the M50 – with the majority of these journeys travelling on one or two sections (i.e. a section between junctions). Therefore, to achieve full capture of all road users the best theoretical solution / scenario would be to deploy new toll points on each section (i.e. between each junction) – requiring approximately ten new toll points. This scenario has disadvantages on a) the cost side of the equation for both capital and operating costs and b) the revenue side which outweigh the benefits of a higher level of capture - basically due to the fact that this scenario requires more infrastructure and more operational resources to collect what will be relatively low individual tolls.

4.2.6 At the other end of the spectrum a scenario with only one additional toll point on the southern section of the M50 was considered and while this was more efficient on the cost side of the equation, the analysis demonstrated this scenario would result in a fairly low capture rate with only about 140,000 to 170,000 journeys being tolled on a daily basis (i.e. approximately 50% of the journeys being made on the corridor).

4.2.7 To capture a reasonably high proportion of the overall journeys made in an efficient manner a variety of scenarios in the middle of this range were assessed. In this regard the preferred solution/s emerged with 4 to 5 of the sections tolled where potential for diversion is limited, with tolling of the slips roads being proposed to manage excessive local diversion. The analysis indicated that these scenarios could result in approximately 200,000 to 230,000 journeys being tolled on a daily basis.

4.3 Preliminary Proposals - Toll Charging Structure

4.3.1 Firstly, the charging structure for any multi-point tolling system tends to be the main focus of customers at the outset, and can have a significant influence on the behavioural response of road users. Setting a charge "too high" could lead to higher levels of toll avoidance, and hence result in a range of negative environmental impacts. Setting charges "too low", on the other hand, would probably result in a financially inefficient system producing low net revenues - as a high proportion of the revenue collected would be consumed by the operating costs. Additionally, in the absence of a strong 'price signal' such as tolling system would probably not deliver on the broader demand management and environmental objectives.

4.3.2 Secondly, all future charging structures need to consider new policy and direction emerging from Europe. In particular the current draft 'Eurovignette' directive, which promotes the concept of distance-based tolling for goods vehicles, 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 also 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.

4.3.3 As part of the preparation of this report, we have developed the likely charges based on the proposed EU methodologies (as they stand today) to ensure that any new charging structure is in accordance with the likely future rules in this area. Specifically this means that the toll charges are comprised of 1) an infrastructure charge and 2) an environmental charge for noise and emissions.

4.3.4 Furthermore, charges can also be varied by time of day, by vehicle class and by customer type (i.e. registered or unregistered). Such variation in charges is applied for different purposes and is therefore described briefly below.

- **Vehicle Type:** Charges currently vary across all Irish toll roads by vehicle type, with the largest sized goods vehicles being charged a rate that is between twice and three times the rate for cars. The basis for the higher charge associated with larger vehicles is the environmental and physical damage that is imposed by larger vehicle classes. European Directives place strict upper limits on the contribution of heavy vehicles to toll collection, and Irish toll charges are within those limits. Nevertheless, more detailed analysis suggests that the optimum rate for the largest vehicles is approximately twice that of cars. This is used as the benchmark for charging of larger vehicles. Furthermore, it is proposed that the number of vehicle classifications is reduced to three in order to simplify the pricing structure

- **Variable by Time of Day:** The Dublin Port Tunnel (DPT) remains the only toll scheme that varies the charge by the time of day. Such an approach to charging reflects that often used in public transport, with fare structures which seek to discourage unnecessary peak travel. For the current proposal, the pricing structure might include an increased charge during peak periods, and a reduced charge off-peak with the net result being revenue neutral. It is not proposed to introduce such a price variation at the outset for practical reasons, but the capability for introducing this should be included in the specification for the

system (subject to cost) to allow for the phasing in of variable charging by time of day as required – i.e. as the network becomes more congested in the future and users become more familiar with the advantages of network tolling / charging.

- **Location:** Whilst it is permissible within the rules to charge different tolls at different location depending on the specific characteristics of that location, care is needed to ensure that such a charging structure does not add unnecessary complexity to the pricing structure which would result in customer confusion. For example, we did consider the option of maintaining a higher toll charge on the existing 'westlink' section of the motorway but this was discounted as the financial case was not sufficiently attractive – and it would also difficult to justify in terms of equity.
- **Customer Type:** The M50 eFlow business model currently accommodates both registered and unregistered users for which there is a degree of variation in the costs associated with managing these users. Currently this is reflected in the variable toll charge (i.e. €2 for a registered user and €3.00 for an unregistered user). Payment by unregistered users adds significant cost to the operation of the system, and while the current uplift in the toll charge for those users is broadly sufficient to recoup this additional cost, we consider that in an attempt to encourage a higher level of registration (and lower costs for both the Authority and road users), that the additional charge for unregistered users should reflect the additional cost of processing those transactions. It is also considered, however, that the existing differential in pricing between tag registration (currently €2.00) and number plate registration (€2.50) could be combined into a single charge for registered users as this would provide customer and operational benefits by reducing complexity.

4.3.5 Detailed modelling analysis of tolling impacts has been undertaken in order to develop an outline charging structure. This analysis indicates that a toll charge in the region of €1.30 at each toll location (for registered users) will meet the requirements of managing the impact of the tolls on local roads, whilst maximising gross revenues and ensuring that collection costs are a relatively low proportion of overall revenue.

4.3.6 Additionally, this basic toll charge of €1.30 for cars would be consistent with the existing toll at Pace on the M3. This €1.30 charge would also apply to the existing M50 eFlow toll point which would be integrated into the new charging structure. No additional charge would be placed on the M3. All other tolls at Enfield, Drogheda and Navan would remain as they currently exist.

4.3.7 As discussed earlier in Section 3.4 regarding the requirement to charge HGV in accordance with the rules set out in the existing and emerging suite of Eurovignette Directives, the proposed tolls are composed of two parts (infrastructure charge and environmental charge) although it is not likely that HGVs would be charged on the basis of emissions class until sometime after the launch of Multi-Point Tolling – in line with any EU and / or national legislation on this.

4.3.8 In addition, as shown in Figure 4.3 below, it is proposed that unregistered vehicles using the system will be subject to an administrative levy of approximately €1.00 at each toll point to cover the additional handling costs involved. This additional charge will also encourage registration and thereby further improve the efficiency of the system by reducing overall operating costs.

4.3.9 Figure 4.3 also sets out the proposed Maximum Daily Charge for the three registered vehicle types / class categories. These have been based on proposed charges for a return journey on the M50 i.e. €3.00 each way for a passenger car which equates to €6.00 Maximum Daily Charge and €4.00 each way for light commercial vehicle which equates to a Maximum Daily Charge of €8.00 and so forth.

4.3.10 Obviously with Multi-Point Tolling the numbers of users paying the toll will increase from about 30% to 75% so that people who currently use the Motorway "for free" will have to pay a toll in the future. With regard to assessing the impact for those existing users who pay today - some will pay less and some will pay more, as set out in the simple example below:

- **Existing Registered Car** using westlink €2.00 each way = €4.00 return journey;
- **Future Registered Car** using westlink €1.30 each way = €2.60 return journey;
- **Future Registered Car** using MPT €1.30 each toll point up to Maximum Daily Charge of €6.00 (which compares as €3.00 each way and €6.00 return journey);

VEHICLE TYPE	Existing Toll Charges		
	Tag Registered	Video Registered	Non Registered
Motor Cars Public Service Vehicles (seating up to eight passengers)	€2.00	€2.50	€3.00
Light Goods Vehicle (unladen weight under 2 tonnes) Bus or Coach (seating over eight passengers)	€2.70	€3.20	€3.70
Goods Vehicle (unladen vehicle weight 2 to 10 tonnes)	€4.00	€4.50	€5.00
Heavy Goods Vehicle (unladen vehicle weight over 10 tonnes) Tractor unit for articulated vehicle	€5.00	€5.50	€6.00

VEHICLE TYPE	Proposed Toll Charges per Toll Point	
	Registered	Non Registered
Motor Cars Public Service Vehicles	€1.30	€2.30
Maximum Daily Charge	€6.00	
Commercial / Goods Vehicles up to 3 axles (10 tonne unladen)	€2.00	€3.00
Maximum Daily Charge	€8.00	
Commercial / Goods Vehicles 4+ axles (over 10 tonne unladen)	€2.60	€3.60
Maximum Daily Charge	€10.00	

Figure 4.3: Existing and Proposed Preliminary Toll Charges

4.4 Proposed Business Model & Rules

4.4.1 The proposed business model (summarised in Table 4.2 below) is influenced by a number of factors including the need to migrate from the existing business model in use on the M50 today, as well as the desire to keep it simple for customers and to establish a framework which promotes high levels of compliance in an efficient manner.

4.4.2 The general objective for any tolling business model is to collect as much revenue as possible as efficiently as possible, thereby maximising the net financial benefits for the stakeholders.

4.4.3 In an ideal world all road users would set up a tolling account and pay on time without the need for any incentives or penalty regime. Obviously this is not the case and the business model and rules therefore need to reward and encourage compliance as well as to visibly deter and penalise offenders.

4.4.4 The challenge is to create a framework which protects the toll revenues due which is fair and balanced for customers and is effective and efficient at dissuading potential offenders from not paying the toll. The current business model achieves this balance (in that 100% of the revenues due are collected in the free-flow environment) by a combination of variable toll charges and a ratcheted regime of penalties for evasion which rise in severity over time.

4.4.5 We are proposing to build on this existing business model with a number of simplifications and amendments as set out below. As noted below, we will need to discuss a number of these items with the Department's Driver Vehicle Computer Services Division to ascertain the quality of the existing dataset.

- Reduction in the number of vehicle classes and corresponding charges to three;
- Standardisation of treatment of Public Service Vehicles across all toll roads if possible – i.e. number of seats (which requires assessment of the NVDF dataset);
- Charging on the basis of gross vehicle weights rather than unladen vehicle weights if possible (which requires assessment of the NVDF dataset);
- Reduction in the number of customer groups by amalgamating the tag and video customer types into one customer type;
- Vary toll charges by applying an administrative surcharge for unregistered users to be €1.00 per toll point (as is the case today);
- Maximum Charge – apply a daily or journey maximum charge for all registered users;
- Penalty regime to be amended to be more in line with other traffic fixed penalty offences (i.e. less steps and lower overall penalty amount);
- Unregistered users will have longer timescales to pay the toll (i.e. the utility model);
- Contact channels for unregistered users to be '*self-serve*' only (e.g. retail, online and phone service auto-attendant); and
- HGV Emissions Class – while not required initially it would be prudent to assess the NVDF datasets for emission class data when having discussions.

	Registered Users	Unregistered Users	Toll Offenders
Toll Charges per Toll Point	Base Toll Charges as per classification below: ▪ Car - €1.30 ▪ LGV - €2.00 ▪ HGV - €2.60	+ €1.00 surcharge per toll point ▪ Car - €2.30 ▪ LGV - €3.00 ▪ HGV - €3.60	+ Fixed Penalty for non-payment with 'discount' for early payment;
Potential Incentives	▪ Discounted Tolls for Registered Users; ▪ Maximum Daily Charge for Registered Users;	No discounts	N/A
Classifications	▪ Cars ▪ Commercial vehicles up to 3 axles (3.5 Tonnes GVW); ▪ Commercial vehicles over 3 axles (>3.5 Tonnes GVW);		
Exemptions	As before (e.g. Garda, Defence Forces, Ambulances, Motorbikes, Disabled Vehicles);		N/A
Payment Terms Invoice / Penalty Notice	Pre-pay (top-up) and Post-pay options with statement at month end. New cash 'top-up' account available – i.e. not requiring payment means;	Pre-pay and Post-pay options (by month end) For unpaid tolls a bill issued at end of month (+5 days) with €5.00 admin charge. 14 day deadline for payment.	Penalty notice issued further 14 days after bill due date with Fixed Penalty of €80; - discount to €40 if paid within 14 days.
Monthly Fee	None for e-statements; €3 for postal statements; Tag fee - €1.21 / month;	No	N/A
Contact Channel	**All Channels** Website IVR – auto-attendant Call Centre Retail (for cash top-up and bill payment)	**Self Serve Only** Website IVR –auto-attendant Retail (for all payments)	**All Channels** Website IVR – auto attendant; Call Centre Retail (cash payments)

Table 4.2. Proposed Business Model

4.5 Proposed Operating Regime

4.5.1 The proposed operational regime will be driven by the approved business model and service to be provided, as well as the key interfaces to be managed such as, for example, the requirement to integrate with the existing national interoperability model. This means that the proposed operating regime will not change significantly with the proposed expansion to multi-point tolling with a couple of exceptions noted below.

4.5.2 The structure of the operating regime is comprised of five main components as follows: i) Roadside Toll Points, ii) technical back office, iii) commercial back office, iv) front office for managing customers and v) a retail payment network.

4.5.3 The operational organisation to manage this operation can be defined under four key roles / units as follows: i) operational management overseeing the following units; ii) financial management; iii) customer relationship management and iv) systems maintenance and support.

4.5.4 As discussed earlier, it is intended that the delivery of multi-point tolling will be managed within the scope of the existing M50 Tolling Operation and as such that the vast bulk of these tasks will continue to be outsourced to the private sector with the vast majority of the people employed in the operation (approximately 260 FTEs today) being employed by private sector.

4.5.5 Essentially the existing operation is already well structured to manage any extension to the operation and the existing contractual framework is also suitable to accommodate the necessary changes to the operation both for the design and development stages as well as for the operational stage. That said, consideration will need to be given to the additional resources and support to be applied during the mobilisation period (i.e. pre-launch and post-launch phase).

4.5.6 The two areas which will probably require the most ‘operational’ effort will be for the revisions and roll-out of i) new customer management processes, procedures and reports to manage customers in the ‘new world’ of multi-point tolling and ii) new financial processes, procedures and reports to handle the change to the revenues / collections.

4.5.7 The NRA has overall accountability and responsibility for the existing and any extended operation as all additional revenues generated will come directly to the NRA and as such the NRA’s operational role will expand as required. In an operational sense (i.e. as opposed to the project delivery role) the NRA’s role can be broadly divided into two areas i) M50 Tolling Operations Management and ii) M50 Financial Management and is resourced by approximately 3 FTEs today.

4.6 Technology and Systems

4.6.1 Barrier-free or free-flow tolling allows for the collection of tolls by electronic means without having any barriers or toll-plaza on the motorways – and therefore no need for motorists using the motorway to stop or slow down to pay the toll charge. While tolling by means of barrier operated plazas is long established practice in many countries, the M50 system is one of the first examples of full barrier-free electronic

tolling on a European motorway, which means that the supply chain is not as mature and product orientated as it is for other ITS systems and equipment.

4.6.2 Multi-point charging systems can either be 'closed' or 'open'. For closed systems, the toll is based on recording vehicles at the entry and exit points, at which point the system calculates the journey made and applies the appropriate toll. With 'open' systems, only certain sections of the network are tolled in order to capture a high proportion of trips made. In theory, the closed systems are more effective but they may require higher investment costs to secure the network. Experience has shown that while both 'open' and 'closed' systems can lose a certain level of transactions for a variety of reasons, both can capture and charge the vast bulk of trips in most scenarios. Our assessment indicates that an 'open' system has significant advantages for deliverability in terms of cost and programme which would outweigh any perceived / theoretical disadvantages when compared with a closed systems.

4.6.3 In summary, any new free-flow multi-point system will be required to be designed to accommodate two main operating cases, as follows:

- Case 1 - When a vehicle is equipped with an electronic tag (also known as an On Board Unit): For those vehicles equipped with an OBU, the toll collection is based on the identification of the OBU performed by the Road side equipment. Whatever the result of the OBU transaction might be, the system has to manage all the possible situations such as invalid OBU, no OBU in the car, multiple OBUs in a single vehicle and of course a valid OBU.
- Case 2 - When a vehicle is not equipped with an OBU: In case where the vehicle is not equipped with an OBU, the toll collection is based on Automatic Number Plate Recognition (ANPR) which is the main function of the Video Enforcement ("Camera") System.

4.6.4 The electronic toll collection system will comprise of three main sub-systems, as follows:

i. Road Side Equipment which includes equipment for the capture of transaction data created when vehicle drives past each individual Toll Point, a video audit system to visually record the traffic flow at that point and signage to inform the road user about the tolls.

ii. On-Board Units (also known as electronic tags) which road users must place in their vehicles to avail of the lowest toll rates; and

iii. Central Computer System, comprising a 'technical' and 'commercial' back office and 'front office' which processes all of the transactions captured by the Road Side Equipment and hosts the IT applications to manage:

- Customer interaction managed by the Customer Service Centre (i.e. the "front-office");
- Processing of Transaction data, payments, violations and tag delivery;
- Provision of reports and toll revenues to the NRA;
- Accounts of toll road users who are registered or unregistered; and
- Databases to store contact address, vehicle and transaction data.

- The central computer system has interfaces for certain business processes including: exchange of data with the Department of Transport's Driver Vehicle Computer Services Division keeper of the National Vehicle Driver File (NVDF), Information Exchange Agent (IEA) and provision of data for Payzone (payments service), the Printing House, Banking Providers and the Enforcement Service Provider.

4.6.5 It is proposed that the expanded system will consist of numerous individual toll points connected to a central system ('back-office') for transaction processing and handling. This will require the existing Toll Operator to procure two bundles as follows: i) any necessary changes to the existing central system and ii) new toll points and roadside infrastructure.

4.6.6 Based on experience of the existing M50 operation and recent benchmarking of performance, we consider that the two most fundamental aspects which should be covered within the new specifications for the Road Side Equipment (and probably linked to the contractual payment and performance structure) are accuracy of transactions (in particular the reading of LPNs) and reliability. This is likely to require some revisions to the existing contractual performance measures in the event that the Toll Points are procured separately.

4.6.7 Additionally, it would be the intention to expressly require RSE suppliers as part of the procurement competition to price for their preferred solution (i.e. the most cost effective to meet the specified performance requirements) as well as a mandatory bid variant to include both front and rear licence plate recognition, in the case that this would not be the preferred solution, to allow the NRA to assess the likely costs and benefits of capturing both front and rear plates. Interesting we note the emergence of single gantry solutions – at least as prototypes – although the technology may not be proven within the timescales required.

4.6.8 Also given the likely scope of the new system to be the future national central system, the specifications will be required to address the need for an 'open' architecture to easily connect new toll points in the future and an 'open' software to allow improved flexibility in the choice of future maintenance options.

4.7 Financial Overview

4.7.1 As shown in Table 4.2 below, the current estimates indicate that the introduction of M50 Multi-point Tolling would result in additional gross revenues of approximately €60 to €100 million per annum which would increase the total gross revenues collected on the M50 Motorway to approximately €160 to €200 million per annum. These figures should be reduced by approximately 20% for operating costs and a further 25% to 30% for taxes which would give an expected range of net revenues of €82 to €108 million and approximately €42 to €52 million of direct tax revenues for the State and relevant Local Authorities.

4.7.2 Therefore in terms of additional net revenues, the introduction of Multi-Point Tolling would result in additional net revenues of approximately €48 to €84 million per annum. This would represent additional direct tax revenues to the State of approximately €15 to €25 million and additional revenue to the NRA of approximately €33 to €59 million, in the first full year of operation.

4.7.3 In terms of operating costs the preliminary estimates indicate that for an increase in costs of approximately €10 million the tolling business would be expected to deliver an increase in revenues before taxes and rates in the range of €48 to €84 million, which underlines how important scale is for this type of electronic tolling in delivering efficiencies. For example the collection costs as a percentage of gross revenues moves form about 26% to 20% in the best case 'Maximum' scenario.

€ millions	Current*	M50 Multi-Point Tolling Range	
Preliminary Estimates	**M50**	**Min**	**Max**
Gross Revenues#	103	160	200
Operating Costs1	(27)	(36)	(40)
Toll Operations	(22)	(30)	(33)
Enforcement	(4)	(4)	(4)
Other (inc. Advisers & Marketing)	(1)	(2)	(2)
Revenues Before Taxes & Rates	**76**	**124**	**160**
Taxes (VAT & Rates)	(27)	(42)	(52)
Revenues After Taxes & Rates	**49**	**82**	**108**
Collection Costs / Revenues	*26%*	*23%*	*20%*
Yield	*74%*	*77%*	*80%*

Table 4.2 Financial Overview

Notes:

- * 2011 Costs;
- # Gross Revenues inclusive of tolls, fines and account charge revenues for M50 only and based on current levels of compliance and toll evasion;
- + Operating Cost Estimates are for first full year after mobilisation period is fully complete and operation is in steady state;
- 1 Operating Costs excluding VAT;
- Taxes & Rates – estimated based on combined rate of 26% (VAT @ 21% and Rates @ 5%);
- Yield defined as (Revenues before Taxes & Rates / Gross Revenues);
- Actual revenues are based on a variety of factors – many of which are interdependent and difficult to accurately predict including for example traffic levels and class mix, compliance and evasion levels for various products;

5.0 Delivery / Procurement Approach

5.1 Procurement Strategy

5.1.1 While the focus is often on the procurement for the supply and operation of any new tolling system there are a variety of other services and supplies to be considered as follows:

A. Design and Installation of new Toll Points and Roadside Equipment including any upgrade of the existing central system;

B. Operation and Maintenance of new Toll Points;

C. Enforcement Service Contract;

D. Marketing / Advertising / Public Relations support in relation to the publicity, marketing and advertising requirements for the new tolling regime;

E. Other support contracts including for example Project Management, Technical Tolling Advisers and communications;

5.1.2 While the main tasks are discussed below, we have also set out a contractual summary of the status of each work-package in Table 5.1 below.

Work-Package	Contractual Status	Comment
Provision of new Toll Points and Roadside Equipment;	Current contract	*Managed by BEF*
Provision of upgrade to central system;	Current contract	*Managed by BEF*
Provision of roadside civils;	No current contract	*Discuss with NRA Network Operations*
Provision of roadside communications	No current contract	*Discuss with NRA Network Operations*
Provision of OBUs / Tags	Current contract	*Managed by BEF*
Technical Advisers	No current contract	*To be tendered in coming month*
Legal & Financial Advisers	Current Contract	
Provision of Operations & Maintenance	Current Contract	
Provision of Enforcement Services	Current Contract – expires in 2012	*May be retendered – or included as part of scope of services for M50 2nd generation contract;*
Provision of Interoperability Services	Current Contract – expires end of 2012	*To be retendered.*
Retail Services	Current Contract	*Managed by BEF – may consider extra retail providers for Multi-Point Tolling*
Banking Services	Current Contract	

Table 5.1: Project Plan Summary

5.2 Implementation – Key Work-streams

5.2.1 There are a variety of interrelated work-streams which require to be resourced and executed to deliver multi-point tolling. These are set out below:

- Legislation – preparation of required primary and secondary legislation;
- Project appraisal – economic and environmental appraisal of the scheme in accordance with guidelines (refer to Section 5.4 below for more details);
- Statutory process management (e.g. draft Toll Scheme and Bye Laws);
- Business Model and Business Rules (as outlined earlier in Section 4.4);
- Systems / Technical specifications (preparation and finalisation to include concepts such as performance requirements, system robustness, redundancy and scalability and flexibility and maintenance philosophies);
- Operational Service requirements (including the specification of key roles and functions as well as service level requirements);
- Procurement - Tolling System – Supply (including preparation of necessary tender documentation and specifications utilising material developed as per above);
- Procurement - Tolling System - Operation and Maintenance;
- Procurement – other contracts e.g. technical advisers;
- Testing - Planning and Management;
- Mobilisation - Planning and Management(i.e. period prior to and after Go-Live);
- Interface Management (e.g. with DVCSD, Enforcement Services Provider, existing toll roads, banks);
- Stakeholder Management (e.g. all of the organisations with whom there is a defined interface and also other stakeholders such as European Commission, Courts Service, Office of the Data Protection Commissioner, Motoring Organisations, Consumer bodies);
- Interoperability Management;
- Marketing, Advertising and Communications (including the preparation and execution of a marketing and communications campaign); and
- Public Relations.

5.3 Implementation – Plan, Programme, Resources and Budget

5.3.1 There is a significant amount of detailed planning and programming (i.e. planning the execution of the individual tasks in a coordinated manner) to bring a project like this to fruition. A high level project plan is set out below (Table 5.2).

5.3.2 In addition there are also items to scope out in particular with respect to the sharing of resources with Network Operations including, for example, possibility of sharing fibre networks, gantries and roadside possessions for works.

Project Plan Summary			Status: Preliminary April 2011
Project Description	To design and deploy a new free-flow multi-point tolling regime on the M50 Motorway by expanding the existing free-flow system currently being operated at a single location (i.e. between Junction 3 and Junction 4) to generate existing tolling revenues for investment in transport infrastructure.		
Objectives	The overarching objective is to collect additional toll revenues from road users on the M50 and to ensure that this is done in an efficient and equitable manner – sub-objectives are to be: ▪ Commercially focused and financially efficient; ▪ Customer focussed and equitable; ▪ Designed to facilitate future demand management requirements; ▪ Fully complaint with existing and emerging EU policy and legislation;		
Approvals & Consents	▪ Ministerial Direction to proceed; ▪ Statutory Approvals process (Toll Scheme and Bye Laws) (NRA Board); ▪ Euro Commission 'approvals' process; ▪ NRA CEO & Board approvals for procurement and contract awards; ▪ NRA CEO and management approvals for any contractual variations; ▪ Planning for new roadside gantries;		
Key Work-streams	▪ Legislation ▪ Project appraisal ▪ Statutory processes ▪ Interoperability Management	▪ Stakeholder Management ▪ Marketing & Communications ▪ Public Relations ▪ DoT / EU liaison	▪ Business Model & Rules ▪ System specs ▪ Operational specs ▪ Procurement ▪ Testing & Mobilisation
Organisation & Resources	▪ Delivery Phase - NRA Internal Delivery and Mobilisation Team (see 5.3.4 below for more details); ▪ Operations Phase - NRA Internal Operations Team; ▪ External Consultancy Support for Delivery and Mobilisation phase (technical, legal and financial); ▪ Main Delivery Suppliers – Toll System Supplier, Toll System Operator; Marketing and Communications Provider; Enforcement Services Provider; Banking and Merchant Services Provider;		
Budget incl. VAT (not approved)	▪ Capital Cost Estimates circa €27 million (+€5 million mobilisation payment); ▪ Total Project Budget Estimates circa €32 million;		
Programme & Key Milestones	Overall delivery programme is approximately 24 months from date of Ministerial direction to proceed; Key Milestones as follows: ▪ ME 1 – Date of Direction to proceed; ▪ ME 2 – Issue Contract Notice for main Tender Packages; ▪ ME 3 – Contract Award of main Tender Packages; ▪ ME 4 – Readiness for Performance Tests; ▪ ME 5 – Readiness for Operational Tests; ▪ ME 6 – Adoption of Toll Scheme/s; ▪ ME 7 – Adoption of Bye-Laws; ▪ ME 8 – Go Live		

Table 5.2: Project Plan Summary

5.3.3 In terms of resources, it is estimated that the NRA would require to establish a delivery team assisted by external technical, legal and financial consultants of approximately 4 to 5 people in the following key roles: i) programme management, ii) stakeholder management, iii) interoperability management, iv) statutory processes and v) operations and finance.

5.3.4 Additionally, it would be the intention following approval to issue a formal instruction to the current Toll Operator contractor to establish a project team for M50 Multi-Point Tolling comprising of the required mix of operational, customer focussed, financial and technical disciplines and with the required experience and capacity to successfully deliver the project.

5.3.5 The overall programme from the point of approval to Go Live (i.e. the new system actually collecting toll revenue) is estimated at approximately 24 months. The key work-streams and phases of the programme are set out on the preliminary programme below.

5.3.6 The global budget for delivery of Multi-Point Tolling is estimated at approximately €32 million (exclusive of VAT) and incorporating a mobilisation operational fund of approximately €5 million. By way of comparison the global budget for delivery of the eFlow barrier-free tolling system in 2008 was approximately €25 million.

5.4 Project Appraisal - Considerations

5.4.1 Tolling and road user charging projects can have a relatively diverse range of objectives and therefore a diverse range of impacts. For schemes which are implemented purely as revenue-raising initiatives, toll charges tend to be set at a level which maximises revenue. This can in certain circumstances lead to higher levels of toll avoidance, the impacts of which can be notable. On the other hand, tolling and road user charging schemes which seek to influence or manage demand can have significant environmental benefits if implemented in a manner which seeks to reflect the ‘user-pays’ and ‘polluter pays’ principles. In other words, charging users for the social cost of road user can lead to quite efficient outcomes, and consequential environmental benefits as well as, but not necessarily, financial benefits.

5.4.2 Following approval to proceed the NRA are required to conduct a project appraisal in line with the existing guidance in this area. As part of the project appraisal process the economic and environmental costs and benefits of the new tolling regime should be reviewed in more detail. The following paragraphs in this section highlight the main areas which would be covered and some likely outputs, based on modelling the preliminary scheme characteristics set out in this report.

5.4.3 Firstly we would expect that the demand responses to tolling would include a number of behavioural impacts, in addition to toll avoidance which is discussed below, as follows:

- Changing the destination in response to the increased cost of travel;
- Linking trips to reduce the overall travel requirement;
- Changing the timing of trips to those periods when user charges are lower (although this is not relevant where the charge does not change by time of day);

- Changing the mode of travel to public transport, walking or cycling; and
- Choosing not to travel at all.

5.4.4 Analysis of demand responses for these schemes suggest a likely reduction in the level of private car use of approximately 450 million vehicle kilometres per annum as a result of these responses. This equates to approximately 5% to 8% of the existing traffic demand through the proposed toll locations, and is in addition to the toll avoidance set out below.

5.4.5 Toll avoidance[1] describes those users who choose not to travel on the tolled route as a result of the charge. Instead, these users remain on local roads for a larger proportion of their trip, only using the strategic routes where they derive greater benefit from them. It is for this reason that tolling / charging schemes can lead to a net reduction in vehicle kilometres travelled. Initial assessment of the impacts of toll avoidance yields a net reduction of 70 million vehicle kilometres per annum as a result of these schemes. The net effect of toll avoidance could reduce traffic volumes through the toll points by between 15% and 20%. This reduction will mainly result from shorter distance traffic reassigning to local roads, and would provide effective protection of the road capacity.

5.4.6 In terms of emissions, this preliminary tolling regime will have two likely impacts – it will marginally increase emissions as a result of toll avoidance, but will significantly reduce emissions as a result of the demand responses. The reduction in vehicle kilometres as a result of toll avoidance and demand responses would be in the region of 520 million vehicle kilometres per annum, and this would result in corresponding decreases in the level of emissions as set out in Table 5.2 (based on the guidance provided by the Department of Transport - Treatment of Transport Emissions in the Common Appraisal Framework : September 2009).

Pollutant	Annual Reduction
Greenhouse Gas Emissions	
CO_2	*93,600 tonnes*
N_2O	*1 tonne*
Non-Greenhouse Gas Emissions	
NO_x	*182 tonnes*
VOC	*65 tonnes*
PM	*9 tonnes*

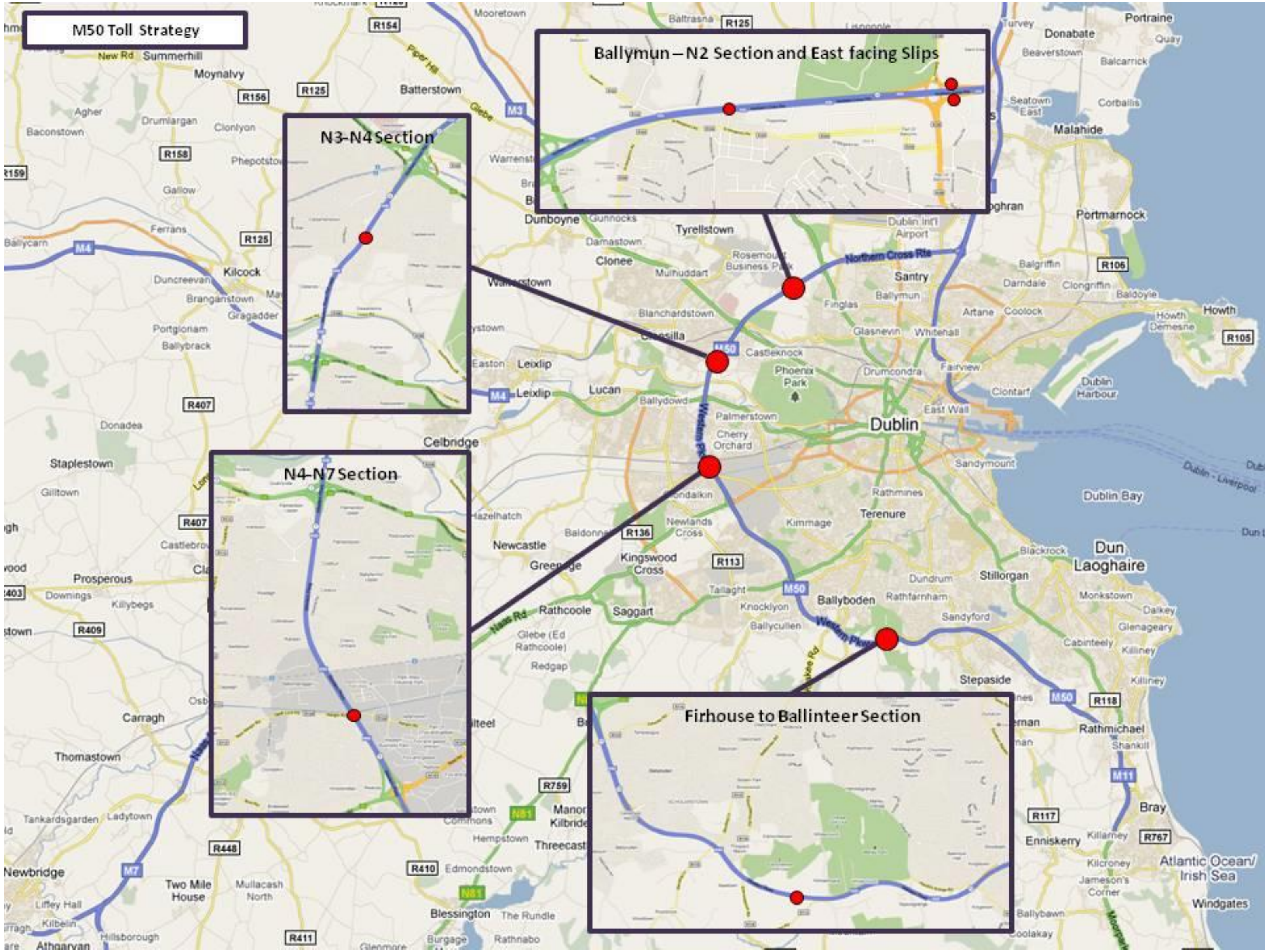
Table 5.2: Potential Impact on Transport Emissions

[1] The term 'toll avoidance' is used in preference to the term 'toll diversion' as toll diversion suggests that users will divert around tolled sections of the road using local roads, rejoining the strategic route beyond the toll point. In practice, this activity is extremely limited (typically less than 2% on existing tolled routes in Ireland). Instead, tolls will discourage users from making longer trips to take advantage of higher quality roads as part of their trip. It is for this reason that charging schemes can lead to a net reduction in vehicle kilometres travelled

Appendices

Appendix A

Map of M50 Multi-Point Tolling
Proposed Locations


M50 Toll Strategy
Ballymun – N2 Section and East facing Slips
N3-N4 Section
N4-N7 Section
Firhouse to Ballinteer Section
Dublin
Dublin Bay
Dun Laoghaire

Appendix A

Appendix B

Report on Network Tolling Options, November 2010.