M50 Demand Management Study

Briefing paper to the Strategic Policy Committees (Transport) of :
Dun Laoghaire Rathdown County Council,
Dublin City Council
Fingal County Council
South Dublin Co Council

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Introduction

The M50 is the busiest road in the country with over 100,000 vehicles using many sections of it every day. The road was originally envisaged as a bypass around Dublin. However its location within the suburbs of Dublin means that it now acts as an orbital distributor for the Greater Dublin Area. Alternative orbital routes further outside of Dublin are unlikely to be built for many years and as such it is vital that the M50 can perform its strategic function for the foreseeable future.

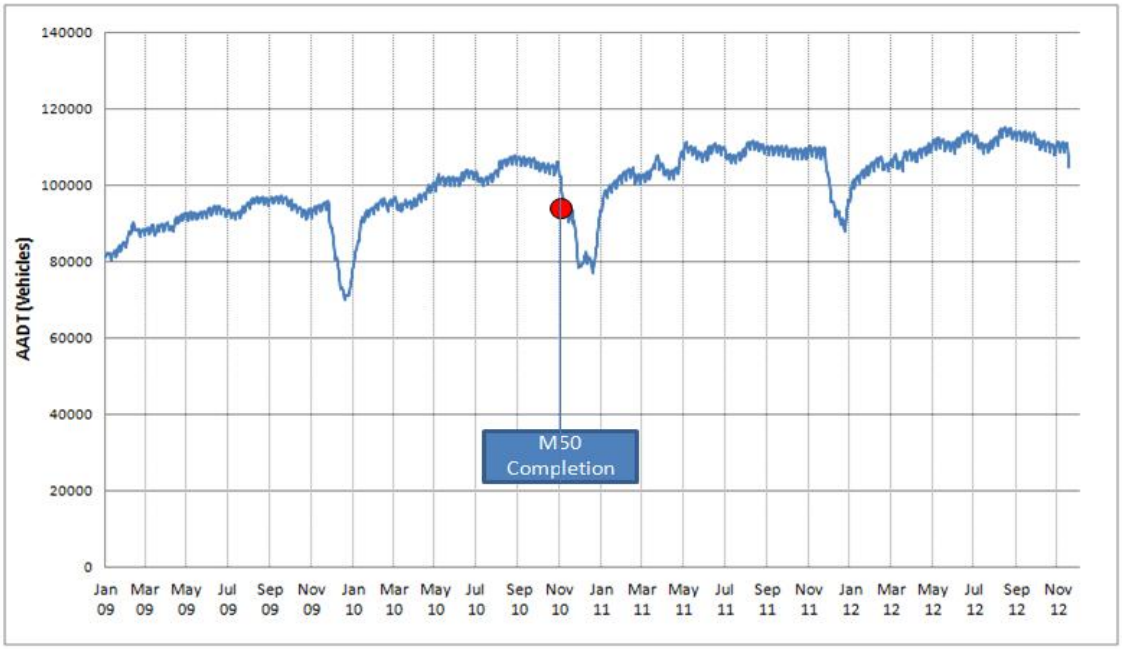
From when it was first opened, traffic on the M50 grew considerably as a result of the easy access it provided around the edge of the city. This led to frequent congestion, with long delays at junctions and also at the old Westlink Toll Plaza. A proposal to widen the M50 and upgrade the junctions was granted permission to proceed by An Bord Pleanála in 2005, and was completed in phases between 2008 and 2010. The traffic analysis undertaken as part of the widening scheme suggested that by 2023 many sections would have traffic flows in excess of 200,000 vehicles per day. As a result, one of the conditions of that permission was to include the development of a scheme of Demand Management Measures; with the condition stating the following:

> ***Condition 7:*** *A scheme of specific demand management measures for the M50 motorway corridor shall be published by the relevant road authorities not later than three years after the M50 Motorway Upgrade Scheme has been completed.*
>
> ***Reason:*** *To protect the traffic capacity provided by the M50 Motorway Upgrade Scheme over its design life*

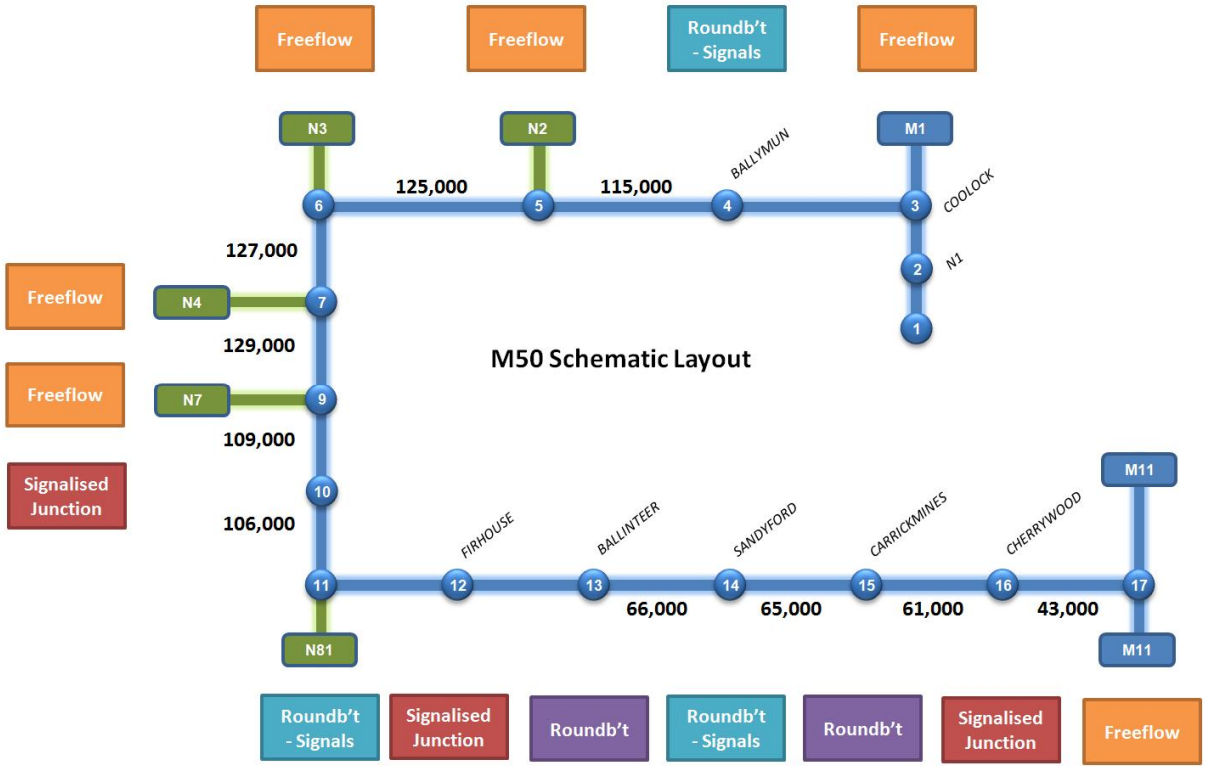
A working group of the four Dublin local authorities and the National Roads Authority (the "relevant road authorities") was set up in early 2012 to study potential Demand Management measures. The working group has now completed the initial phase of work and considers that sufficient work has been completed to inform the Strategic Policy Committees (Transport) of the various Local Authorities. This is in advance of the September 2013 deadline set out by An Bord Pleanála.

Traffic Conditions

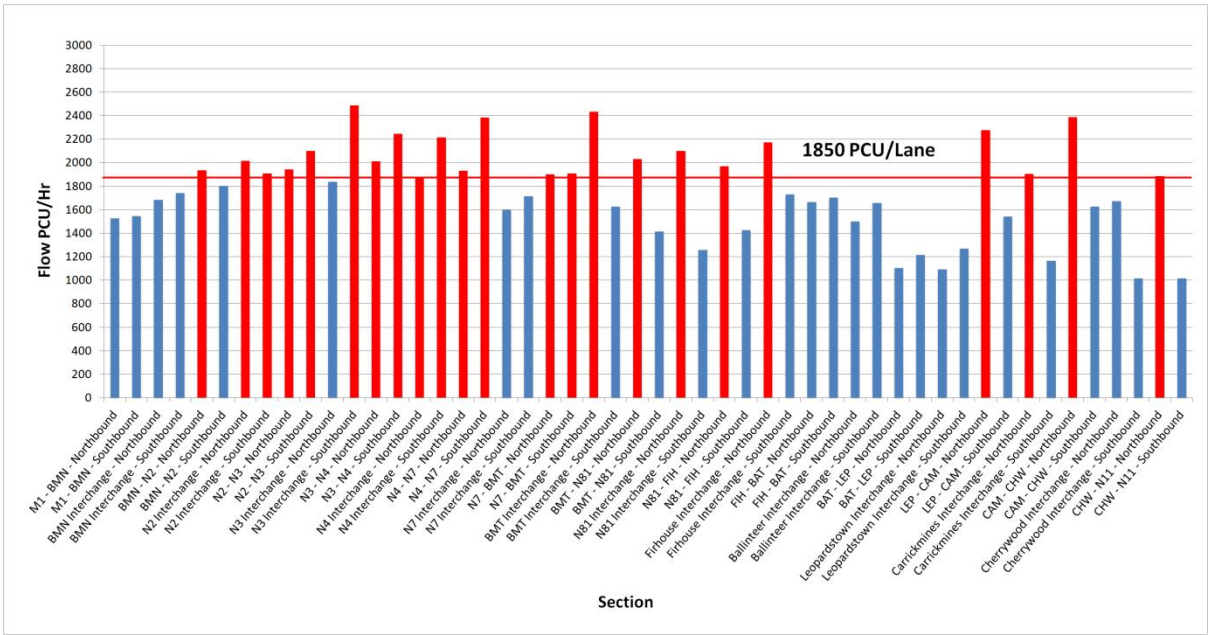
There has been ongoing growth in traffic flows on the M50 since moving to freeflow tolling in August 2008 and the completion of the upgrade in September 2010. The figure below shows average daily traffic flows between 2009 and 2012 at the existing toll location on the Westlink.



It is important to note that this increase has occurred against a background of decreasing traffic elsewhere, with a 5% reduction in traffic on other National Primary Roads over the same period. Research has been carried out which shows that once traffic flow in a motorway lane exceeds 1,850 passenger car units (PCU) per hour, congestion and more frequent incidents and collisions will start to occur. The figure below presents average weekday daily traffic volumes from February 2013.



As outlined above it is considered that 1,850 PCU's is the safe operational capacity of a motorway lane above which the likelihood of breakdown increases significantly. The figure below shows predicted traffic flows on each section of the M50 by 2023 with links experiencing a flow above 1,850 PCU's highlighted in red.



This demonstrates quite clearly that if traffic on the M50 continues to grow, within 10 years congestion will once again be commonplace.

Objectives of M50 Demand Management Scheme

In order to identify the best specific demand management measures on the M50 corridor it was necessary to first be clear about what the measures needed to achieve. In line with standard procedure for transport schemes, a set of Scheme Objectives were established so that a comparison could be made of various different options. At a high level the objectives were to:

- reduce demand on the M50, such that it operates without congestion for longer; and
- improve the safety and reliability of the M50 by reducing congestion.

In line with the Department of Transport, Common Appraisal Framework Guidelines a set of eight more detailed objectives were agreed which formed the basis for the comparison of alternatives, and for the appraisal of the indicative preferred scheme.

Indicative M50 Demand Management Scheme

An indicative package of measures has been identified as those which best address the objectives. These are summarised below and described briefly in the following paragraphs.

- Fiscal Measures
- Intelligent Transport Systems/Traffic Control
- Travel Information
- Smarter Travel Measures
- Control

Fiscal Measures: Distance Based Tolling by Vehicle Type on the M50

The study has concluded that the current single point tolling system should be replaced with a distance based system comprising approximately 4 or 5 toll points. For the purpose of carrying out an ex-ante evaluation of the costs and benefits associated with the indicative scheme a toll of €1.30 has been assessed as the base toll rate for cars. However, the implemented tolling scheme may include a toll amount of between, say, €1.00 and €2.50 which would be determined as part of a Draft Toll Scheme Statutory process. Toll amounts will vary for different vehicle types as is the case with the current single West Link toll and potentially may vary for different emissions classes. Other factors that would need to be considered as part of the Draft Toll Scheme would include whether to provide for variable tolls related to time of day and/or day of the week (e.g. reduced toll rates at off-peak times and/or weekends). Another consideration would be whether to implement closed system tolling which would charge for km's of the M50 used based on entry and exit point.

Intelligent Transport Systems/Traffic Control: Variable Speed Limits

The study has examined the practicality and effectiveness of Variable Speed Limits (VSL) along the M50. Good guidance exists on the implementation of VSL, as does good information on its impacts and benefits. The feasibility studies have identified that the section of the M50 between Junction 3 (M1) and Junction 14 (Sandyford) is suited to the implementation of VSL. This would be expected to have a notable impact on journey time reliability and safety as the M50 experiences periods of near-congestion.

Intelligent Transport Systems/Traffic Control: Incident Detection

The study has included the provision of Incident Detection as a key strategy for managing demand along the M50. An appropriate incident management desk will be provided within the existing Traffic

Control Centre, and lines of communication will be established between the incident room, key media outlets and the emergency services. The detection and management of incidents will reduce the safety risks associated with knock-on incidents following a collision, and provide ample warning to other road users of potential disruption so that they can take this into account when planning journeys.

Information: Internet

The provision of Variable Speed Limits, Incident Detection, and tolling schemes will require a large amount of roadside detection and monitoring equipment, which will be collated and monitored through the Traffic Control Centre. This information will be provided to road users via the internet – either through posting on web pages, or news feeds. This is a low cost means of providing relevant, up to date information on the road network. During times of congestion, this information can be used to actively encourage potential road users to make alternative travel arrangements, and in this context will be an effective demand management tool.

Information: Roadside Information

Similarly this information will be provided to road users via Variable Message Signs, which are currently provided throughout the Dublin Area, with approximately 35 signs provided along the M50. This will provide information that is fully up to date to road users in the middle of their journey.

Smarter Travel: Area-Based Travel Planning

The study investigated the potential for Area-Based travel planning in order to manage demand on the M50 and concluded that whilst travel planning can have a significant local impact in terms of reduced traffic demand the impact on the M50 corridor itself would be limited to a modest reduction of traffic demand of between 1% and 2%. A number of locations have been proposed:

- Sandyford/Stillorgan;
- Park West;
- City West; and
- Cherrywood

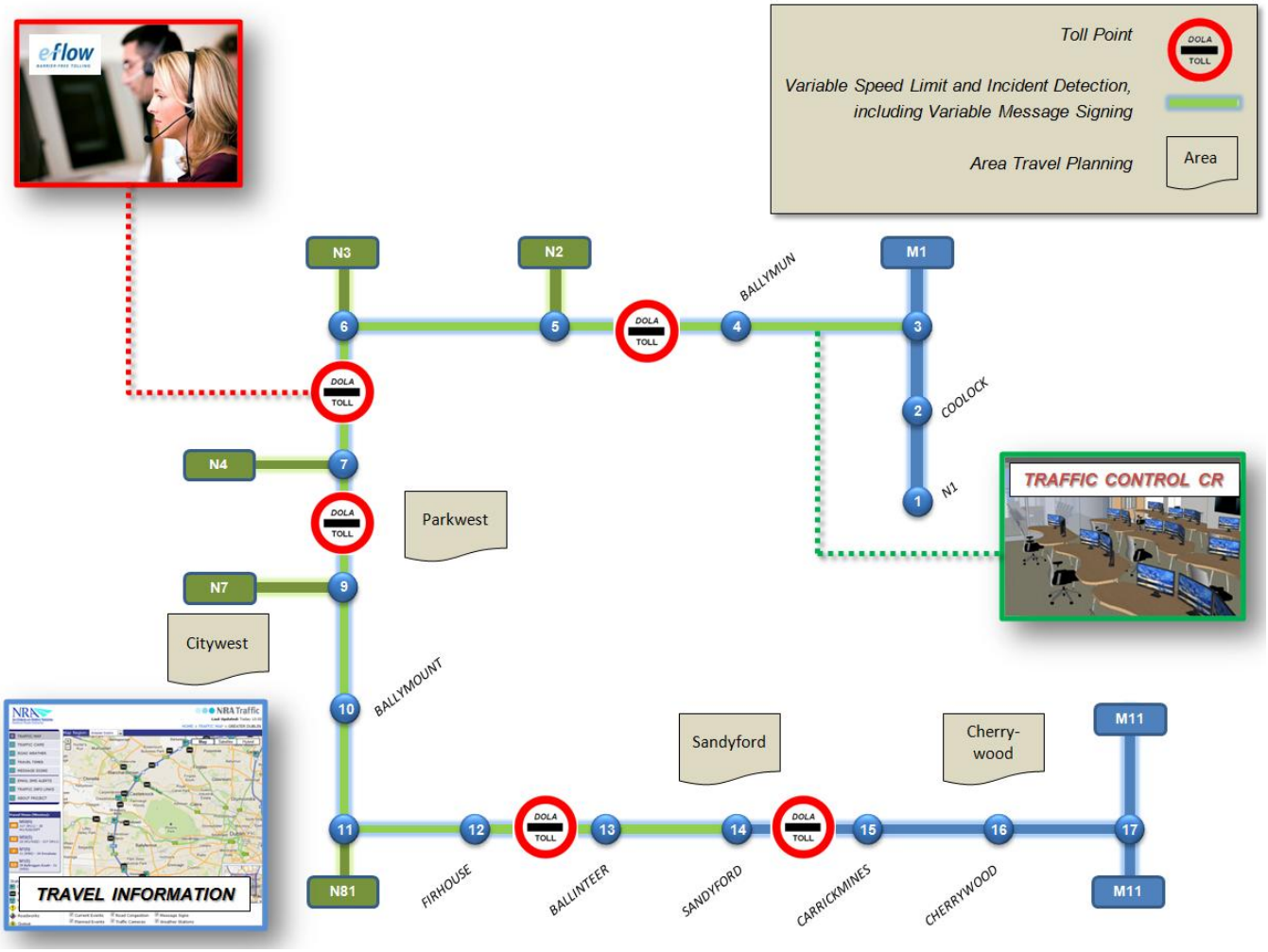
The implementation of Area Based Travel Planning can effectively be delivered by the Local Authorities as part of their integrated land-use and transportation planning. Examples of this approach include Adamstown and Sandyford Industrial Estate.

Control: National Control Centre

The Intelligent Transport Systems measures set out earlier are all based on the provision of a Traffic Control Centre to monitor road conditions, respond to incidents and provide relevant information to road users. The existing Control Centre located in the Dublin Port Tunnel is insufficient in its current layout to meet the requirements of an increased level of management, and an expansion of that facility is currently being examined. It is envisaged that a single control centre would manage all the operational functions of the national roads network.

Indicative Scheme of Demand Management for the M50

A schematic layout of the indicative scheme is shown below.



The schematic shows the extent of the Variable Speed Limit and Incident Detection between the M1 and Sandyford, supported by Variable Message Signs and web information as a means of disseminating information. The National Traffic Control Centre is a key element of this suggested deployment strategy. The indicative locations of the toll points are also shown, these additional toll points would be integrated into an expanded version of the existing e-flow system.

Impact of the Indicative Scheme

The introduction of tolls leads to a number of changes in traffic behaviour.

- **Reassignment**, where road users change their routing to avoid tolls. For such users, the perceived additional travel cost associated with using longer routes is less than the cost of the toll;
- **Mode switching**, where road users change travel mode due to the increased cost associated with travelling by private car. Such changes include switching to bus or rail for longer trips, or to walking or cycling for shorter trips;
- **Demand changes**, which describe decisions to travel to alternative (lower travel cost) destinations, to link trips together in order to reduce overall travel costs, or decisions not to make a trip at all.

As a result of these changes in travel behaviour the transport model developed for the study forecast the following changes in traffic patterns:

- A strong reduction in traffic volumes around the M50 albeit with very little change on the M50 between junctions 6 and 7 (Westlink) where the existing toll would be reduced
- An increase on a number of the regional roads connecting Swords with the N2/Ballymun/Finglas area. The proposed Swords Western Ring Road is intended to cater for these movements in order to relieve traffic volumes on the congested section of the M1 between Swords and the M50
- An increase on the north-south roads connecting the N4 and N7 through the Lucan/Clondalkin Area. The increase on the Outer Ring Road is particularly evident, while both the Outer Ring Road and the Fonthill Road have been the subject of significant investment in recent years to facilitate movement through this area; and
- Some minor rerouting onto alternative east-west routes in the vicinity of Ballinteer

The assessment demonstrates that the impact of the M50 toll scheme will be positive in terms of reducing demand on the M50, although the consequential increases on other roads will require the consideration of some targeted traffic management measures in the final scheme to mitigate these impacts. Such measures would seek to reduce toll avoidance through sensitive areas, or improve safety and/or capacity on those roads which receive additional traffic. Overall the scheme will also lead to safety and reliability improvements for users.

The indicative scheme will lead to an increase in revenue collected from the e-flow system due to an increase in the amount of M50 users captured in the tolling scheme. The toll capture rate of M50 users increases significantly which ensures equality for all users and ensures that the demand management measures are effective for the full length of the M50.

Measurement	Existing	Indicative Scheme
Toll for Cars	€2.60[1]	€1.30
Tollable Traffic	39%	81%
Average Toll Paid (Tollable Traffic)	€2.60	€2.33
Average Toll Paid (All Traffic)	€0.98	€1.90

[1] *Toll for Video-Registered Customers*

The business benefits to commercial traffic would be significant, a reduction in journey time variability and greater ability for just-in-time haulage, in addition to reductions in journey times during peak periods. As mentioned previously it should be noted that the above toll charges are not yet definitive and the final scheme will revisit toll charges with values of between €1.00 – 2.50 per PCU (passenger car units) considered with Heavy Goods Vehicles, (HGV) representing two PCU's on average. The impact of the indicative scheme on overall M50 toll revenue is outlined below.

Scheme	Existing Revenue	Scheme Revenue	Gross Increase in Revenue	Increase in Operating Costs	Net Increase in Revenue
M50	€86m[1]	€148m	€62m	€5m	€57m

[1] *€86m is Adjusted Revenue – defined as existing M50 revenue without inclusion of levy for unregistered users. Actual revenue from M50 is €95m.*

The M50 South Eastern Motorway

The scheme of demand management measures for the M50 motorway corridor considers only that section of the M50 which was the subject of the approved M50 Upgrade Motorway Order. There is increasing pressure for future upgrade of the M50 between Sandyford and the M11, which would likely also require specific demand measures. It is feasible for the potential scheme outlined here to be subsequently extended to incorporate the remaining section of the M50 at an appropriate time.

Implementation

The indicative timescale for the implementation of the various measures, subject to various approval procedures, is shown below

Measure	0 - 12 months	12 - 24 months	24 - 36 months	36 - 48 months	48 - 60 months
Variable Speed Limits	Planning	Implementation			
Incident Management System			Implementation		
Toll Scheme	Planning	Implementation			
Smarter Travel Planning	Planning		Implementation		

Summary

The M50 Demand Management measures will protect the functionality of the M50 into the future. The various elements of the indicative scheme are set out below;

Category	Measures Taken Forward
Fiscal Measures	Distance-Based Tolling Tolling by Vehicle Type
Intelligent Transport Systems/Traffic Control	Variable Speed Limits Incident Detection and Incident Management
Travel Information	Internet Roadside Information
Smarter Travel Measures	Area-Based Travel Planning
Control	National Traffic Control Centre

The financial assessment found that the fiscal scheme would operate at a significant surplus whilst the economic appraisal of all elements of the indicative scheme found that the scheme would have a strong business case. This demonstrates the feasibility of the indicative demand management scheme which can provide a basis for the development of a detailed scheme for implementation.