Sustainable Development Evaluation of Road Infrastructure Programmes and Projects

Section 1

Handling of Traffic Modelling Issues in Road Infrastructure EIA in Ireland

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SOCIO ECONOMICS

The Socio Economics Section of the Environmental RTDI Programme addresses the need for research in Ireland to inform policymakers and other stakeholders on a range of questions in this area. The reports in this series are intended as contributions to the necessary debate on Socio Economics and the environment.

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1. Introduction

The EIS documents for the following road schemes have been read, and the traffic modelling analyses examined and critiqued:

- Outer Ring Road, February 2001
- Adamstown Roundabout to N4 Scheme (Outer Ring Road), November 2003
- M50 Motorway Upgrade Scheme.

We start with an overview of the three EISs considered. Two of these related to the Outer Ring Road in West and South County Dublin, the other one being the M50 Upgrade Scheme. We start our discussion of traffic models by giving an overview of traffic modelling practices internationally. Following on from this, we briefly describe some of the key transport infrastructural assumptions input into the models. We then start our analyses of the traffic models in each scheme. One of the difficulties encountered with examining traffic models use in EISs is that, generally, there is very little information provided in an EIS on the detailed structure of the model. The three EISs considered here are no exceptions. However, we are in the fortunate position to have obtained considerable data for the model used in the Outer Ring Road 2001 and 2003 EISs from the Lucan Together for Quality of Life (LTQL) community group, who obtained much of this information at An Bord Pleanála's oral hearings and using the Freedom of Information Act. We examine each scheme EIS under three broad headings:

- Assumptions: including extent of network encoded into each model, and the consideration (or not) of induced traffic
- Validation, and
- Predictions

In each case, we endeavour to include the response of An Bord Pleanála's Inspector to the issues raised. With regard to An Bord's consideration of traffic models in EISs, particularly in the Greater Dublin Area (GDA), we suggest that there is a potential conflict of interest in the reliance on the DTO by An Bord. This pre-disposition of An Bord to the DTO, results in a lack of critique by An Bord of the DTO's evidence given at oral hearings. This is despite the fact that the DTO are frequently protagonists in the case for proposed schemes, particularly since Local Authorities often rely on them for model validation and model runs. The DTO's conclusions should be subject to the same level of scrutiny as other witnesses at hearings. We suggest, therefore, that An Bord Pleanála should employ its own independent traffic modelling experts.

We conclude our assessment of the EISs by discussing the following issues:

- Implementation of the scheme
- Pedestrian modelling
• Alternatives considered and compliance with the EIA
• Public consultation and disabled access to the EIS texts.

2. Overview of the Schemes

2.1. Outer Ring Road 2001

The corridor for the Outer Ring Road (ORR) has been a long-term objective on the draft development plans of Dublin County Council and later, South Dublin County Council since the early 1970s [ORR2001-EIS]. In 2001, when the DTO produced their Strategy 2000 – 2016 “A Platform for Change” document [DTO Platform], they included the ORR as one of 11 strategic roads in the Dublin region. The route incorporated a link from the M1 to the north with the N81 to the south in a route approximately parallel to the M50 – see Figure 2-1 below.

With regard to the concept of a strategic road, the DTO state:

“The Strategy includes a number of non-national road projects that have a strategic influence (as distinct from local impacts).

The main criteria for inclusion are that the project should:

• provide for proper management of access to the M50 and/or national arterial routes;
• complement the Strategic Planning Guidelines;
• serve critical economic development needs in the Metropolitan Area or in the development centres identified in the Strategic Planning Guidelines;
• provide other environmental or safety benefits;
• increase capacity for public transport.”

The DTO provide time-scales for the completion of two portions of the ORR, namely:

• 2003 – 2006: Cheeverstown to Lucan
• 2010 – 1016: Lucan to N2
• No completion time-scale is given for the section N2 to M1.

However, when the first ORR EIS was published by South Dublin County Council in 2001, they re-characterised the road:

“While the original ORR proposals were to facilitate an additional road link across the River Liffey on the western periphery of Dublin, the original corridor for the road link immediately north of the River
Liffey has since been dropped by Fingal County Council from their current Development Plan. Completion of the ORR link as now proposed would create a strategically important 'Regional Distributor Road' within South Dublin County.”

and split the project further for the section south of the Liffey:

“The overall scheme will be developed in three main parts:

1. Balgaddy to N7 Kingswood
2. Kingswood to Cheeverstown
3. Balgaddy to N4, Lucan”

In fact, Part/Phase 3 was built a number of years prior to the publication of the ORR-2001 EIS for Phase 1, as residential development progressed in that part of Lucan, Co. Dublin. The Phase 3 section, is locally referred to as the Ballyowen/Pennyhill/Balgaddy road, and comprises three roundabouts at those locations.

The ORR-2001 EIS relates to Part/Phase 1 – Balgaddy to N7 Kingswood. Following an oral hearing before An Bord Pleanála in the summer of 2001, the road was granted planning permission for the section from Kingswood to the proposed Adamstown roundabout, 260 m south of the existing Balgaddy roundabout. However, the board's Inspector, Mr. Brendan Devlin, recommended that the section from the proposed Adamstown roundabout to the existing Balgaddy roundabout not be completed until an EIS be produced for the Ballyowen/Pennyhill/Balgaddy section. One of his reasons for this was that the ORR-2001 EIS stated that the road would have “a major negative impact” on the northern (existing) section of the ORR. However, the geographical extent of the ORR-2001 EIS did not cover that section of road! The board accepted the Inspector's recommendation.
2.2. Adamstown Roundabout to N4 Scheme (Outer Ring Road 2003)

The EIS for remaining section of road from the Adamstown Roundabout to the N4 was published in November 2003 [ORR2003-EIS]. The proposed scheme consisted of the continuation of the ORR, already granted, from Kingswood to the Adamstown roundabout to link with the Balgaddy roundabout; i.e. the same route they had presented in 2001. However, there were a number of changes to the proposed road and additional link roads were incorporated, compared with the original 2001 scheme. These included:

- A link from the Adamstown roundabout eastwards to the Fonthill road
- Single-lane dual carriageway, with a 1 metre wide, 125 mm high central median for the main route: Adamstown roundabout to Lucan road
- Bus priority and cycle routes on both carriageways of the main route
- Conversion of the Ballyowen, Pennyhill and Balgaddy roundabouts into signalised junctions
- Conversion of the Foxdene/Ronanstown roundabout on the Fonthill road into a signalised junction

2.3. M50 Upgrade

The EIS for the M50 Upgrade was published jointly by the four Dublin Local Authorities in September 2004 [M50Upgrade-EIS] as a capacity-enhancing
scheme to the existing M50 motorway. The proposal is summarised in Section A of the Non-Technical Summary as follows:

• “Widening of 31 km of the M50 Motorway to three lanes in each direction between the M1 Interchange and the proposed Sandyford Interchange (currently under construction). An additional auxiliary/weaving lane in each direction will also be provided between the M1 Interchange and Scholarstown Interchange

• Upgrade of 10 interchanges along this section of the M50

• Upgrade of the Westlink toll plaza to a fully electronic free flow toll facility”

3. Current International Traffic Modelling Practices

3.1. Macrosimulation versus Microsimulation Models

Broadly speaking, there are two types of traffic model in use by practitioners and academics world-wide. These are macrosimulation models and microsimulation models. The macrosimulation approach is the older approach, with more than 30 years of research and development behind it. This traditional static assignment method of traffic prediction for transportation-planning is based on a four-step process [Nagel1]:

1. Trip generation: This module generates, for each traffic zone, the number of trips starting there and the number of trips ending there. This can be done for arbitrary time slices, but is often done for a typical 24-hour weekday.

2. Trip distribution: Trip generation results in sources and sinks, but not how they are connected. The connections are determined in the trip distribution module. The result is an origin-destination matrix, which has, at row \(i\) and column \(j\), the number of trips going from zone \(i\) to zone \(j\).

3. Modal choice: In this module, the trips are split between the modes of transportation.

4. Route assignment: For each trip, a path is found through the network so that no other path is faster. Congestion is taken into account via the link travel time being a function of the trips using that link.

Macrosimulation models have a number of shortcomings [Nagel1, Nagel2], the most fundamental of which, derives from the fact that the mathematical foundation of the traffic assignment is valid only for time-independent problems. Consequently, time-dependent dynamics cannot be easily represented. Examples of these are queue-build-up from bottlenecks, or sequential “chaining” of trips. Nagel sums up the difficulties[Nagel2]:

“Static assignment has many shortcomings. For example, it does not correctly represent dynamic effects such as queue build-up, and it does not have enough microscopic information to do, for example,
emission calculations. It also de-couples decisions from individual actors. For example, the only decision available for modal choice is the origin and the destination of the trips; important aspects such as income, car ownership(!), additional trips during the day, etc. are not used. Note, however, that these latter aspects could be overcome by a different software design. What cannot be overcome are the shortcomings in the representation of dynamic effects.”

Given that the theoretical foundations and practical implementation of the traditional four-step approach have been established over such a long period, it is not unsurprising that newer techniques have taken time to be accepted. However, these newer techniques—microsimulation models—have now certainly moved into mainstream use. This is partly due to the availability of high-end computational resources, provided either by dedicated supercomputers or by cheaper Beowulf-type parallel clusters based on commodity hardware. Two examples of such microsimulation packages in wide-spread use are:

- **TRANSIMS**, “an agent-based simulation system capable of simulating the second-by-second movements of every person and every vehicle through the transportation network”[TRANSIMS1], developed at Los Alamos National Laboratory, and used by the Department of Transport (DoT) in the United States, and

- **Paramics Microsimulation**, developed by SIAS Transport Planners in the UK [Paramics1].

Microsimulation models maintain the individuality of travellers throughout the modelling process, by modelling on a traveller-by-traveller basis. Decisions, which may be made by individual travellers, are incorporated into the modelling process. This approach still allows planners to extract more conventional aggregated quantities, such as the fraction of travellers who chose public transport for example, but also allows the generation of detailed data on air or noise pollution. Within the last 10 years, the cost of computational resources required to employ such models has become affordable, and this should no longer be considered an obstacle to their use.

### 3.2. DTO Modelling Practice

The DTO use the macrosimulation approach for their Full-Area model. Based on the SATURN [SATURN1] suite of software, it is reputed to be one of the largest models of its kind in Europe. To the best of our knowledge, the DTO do not carry out large-scale modelling using microsimulation models. Certainly, all models used in the two Outer Ring Road EISes and the M50 EIS are either derived from the DTO macrosimulation model, or are actually the DTO Full-Area macrosimulation model.

Microsimulation models have been employed by the DTO, and by some private transportation planning companies in Ireland, but only for localised traffic simulations. For example, Paramics was used by SIAS Transport Planners Ltd. in preparing the Adamstown Link Road EIS [ALR-EIS].
Although such tools have not been employed in large-scale models, it is our understanding from recent informal discussions with modelling staff in the DTO, that they are currently investigating microsimulation software for large-scale use.

3.3. Modelling Practice in other Countries

As already stated, the US DoT uses the TRANSIMS suite. This software is the result of an effort to develop new transportation and air quality modelling methodologies required by the Clean Air Act, the Transportation Equity Act for the 21st Century and other regulations [TEA21]. It is now in wide-spread use in the US.

In Europe, Raney and Nagel [Raney1, Raney2, Nagel3] have created a model, using TRANSIMS, for the entirety of Switzerland and its 5 million travellers!

3.4. National Roads Authority Modelling Advice to Irish Traffic Modellers

In the UK, the principle document which guides Traffic Model professionals is the Highways Agency's (HA) “Design Manual for Roads and Bridges” [HA-DRMB]. The National Roads Authority (NRA), have adapted some of the volumes of this manual to create an Irish DMRB [NRA-DMRB]. However, the NRA document consists of nine volumes derived from the first nine of the Highways Agency's DMRB 15 volumes. Of the volumes 10 – 15 of the HA DMRB, missing from the NRA DMRB, volume 12 relates specifically to traffic modelling. We have been informed by the NRA, that whilst the NRA does not provide any specific instruction or guidance to traffic modellers on what documents to use in preparing a model, it nonetheless expects that traffic modellers would most-likely use the HA DMRB [NRA-Meeting].

4. Transportation Assessment: Assumptions as Inputs to the Traffic Model

In each of the EISs examined, the level of transport infrastructure assumed for both the opening year and operational year of the road scheme is as defined in the DTO's Strategy 2000 – 2016 “A Platform for Change” document [DTO Platform]. The DTO's document informs Government policy on transport. However, history tells us that the Government's implementation of these initiatives has been slow or changes frequently. For example, the Metro proposal announced in “Transport 21” consists of a dramatically reduced version of the DTO's proposal. Many of the elements of the DTO's strategy have yet to be implemented or are well behind schedule. Therefore, the expected level of public transport infrastructure stated in the EISs can be described, optimistically, as the best-case scenario. This assumption, which feeds into the traffic model, is a major flaw within these EISs. What is required is a proper empirical analysis of policy implementation to determine a “rate of advancement of policy initiatives” in an Irish context. From this, one could derive a likely-case scenario for public transport and other infrastructural initiatives, instead of using the aspirational best-case scenario.
5. Traffic Model Assumptions

One of the difficulties encountered with examining traffic model analyses in EISes is that, generally, there is very little information provided on the detailed structure of the model; namely, the number and geographical extent of fine and coarse zones, and the specific network links (representing roads) encoded in the model\(^1\). However, through a Freedom of Information Act inquiry, the community group, Lucan Together for Quality of Life (LTQL) obtained considerable detailed information on the traffic models used for the Outer Ring Road EISs (2001 and 2003). This consisted of the zonal maps and network links maps in conjunction with AM Peak and Off-Peak traffic flows on each link for all scenarios presented in the EIS. This model was derived from the DTO’s Full Area Model by Arup Consultants.

Having examined this information, we now present our evaluation of this data.

5.1. Extent of the Road Network Encoded

5.1.1. ORR 2001

It is our view that there are at least five important roads in the study area that were not encoded into the model. These are:

1. The Neilstown Road which runs from the Southern end of the Newlands Road to the Coldcut Road, and connects with the new road west towards the ORR (at node #9812).
2. The Cloverhill Road which also connects the Southern end of the Newlands Road to the Coldcut Road.
3. Upgrade of the existing road from Balgaddy Roundabout to Ballydowd Interchange.
4. The proposed bridge over the River Liffey connecting to the Ballydowd interchange as described in the DTO “A Platform for Change” document.
5. The Westlink Toll Bridge on the M50.

Neilstown Road and Cloverhill Road

The first two of these roads are main roads in the study area, used as diversionary routes (“rat-runs”) by motorists avoiding parts of the N4, and should have been coded for the purpose of this study.

Upgraded Ballydowd Interchange

At the time, SDCC and Arup Consulting were studying the third road mentioned above, with a view to designing a road-improvement scheme. This section of the road is part of the Strategic Outer Ring Road in the DTO’s “A Platform for Change”

\(^1\) A zonal map is provided in the ORR/2003 EIS
document [DTO Platform]. (Its upgrade has subsequently been incorporated into the N4 Upgrade Scheme, which was granted by An Bord Pleanála in late 2005). However, an improved version of this existing road was not incorporated into the model.

**Future Possible River Liffey Bridge**

The fourth road mentioned—an M50-style bridge crossing the River Liffey northbound from the Ballydowd Interchange—was alluded to by South Dublin County Council's traffic model witness¹ in his revised traffic modelling evidence to An Bord Pleanála's oral hearing during 2001. The witness stated that the revised simulations were based on the then newly published DTO “A Platform for Change” document. He went on to state that the latter document considers the Outer Ring Road as one of 11 Strategic Roads in the Greater Dublin Area. Reference to the DTO document itself shows a map (Page 15, Figure 8 in the DTO's summary document) with the ORR crossing the River Liffey at the described location. This map is reproduced earlier here in Figure 2-1. Given that the DTO position the route of the ORR intersecting several major roads to the North, (the N3, the N2 and the proposed extension of the M1 Motorway), the absence of these latter links from the encoded model is both surprising and significant.

**Westlink/M50 Toll Bridge**

With regard to the fifth road listed above, on page 106, EIS Volume 1, Paragraph 2, it is stated that:

> "The Toll Plaza on the Liffey Bridge is just outside the study area, however peak period queues from the Toll Plaza can result in some difficulty accessing the M50 northbound from the N4."

Given the fact that the authors recognise the Toll Plaza as having a significant impact within the Study Area, it could have and should have been incorporated as a network link in the model.

**5.1.2. ORR 2003**

As already stated, South Dublin County Council presented their revised plans for precisely the same route for the ORR in 2003. Again, there are a number of errors and omissions in relation to assumptions made about the traffic model as presented in this second ORR EIS. Firstly, we note that the Neilstown Road and Cloverhill Road which were omitted from the ORR/2001 EIS are included in this one. Two important roads are not encoded into model network, which could materially alter the distribution of trips on that network. These are:

1. The proposed bridge over the River Liffey connecting to the Ballydowd Interchange as described in the DTO's “A Platform for Change” document.
2. The Celbridge Interchange, a high capacity interchange (one of the largest) on the N4/M4.

¹ Mr. Anthony Dolan (Arup Consulting)
Future Possible River Liffey Bridge

The importance of incorporating the Liffey Bridge north of the Ballydowd Interchange was stated in the previous subsection. In Figure 3.2 of the EIS, three options are indicated as possible long term crossings of the river Liffey – see Figure 5-1 here. Options 1 and 2 are shown connecting with the ORR at the Ballydowd interchange, and then heading northwards. Option 3 shows the link leaving the ORR at Kishoge heading west along between the railway line and the canal and then northwards, crossing the Liffey at the Leixlip interchange. If either Option 1 or 2 were selected, this would clearly alter the trip patterns in that area; leading to much higher traffic flows on the northern end of the ORR than if Option 3 were selected. In evidence to this at An Bord Pleanála’s oral hearing (March 2004), it was stated that none of these crossings were modelled because no decision had been taken on which was the favoured option. In the absence of such a decision, it would have been prudent to model at least that option which was indicated in both the DTO’s “A Platform for Change” document and the (statutory) Development Plan of the time; namely Option 1. Repetition of the same omission by the Local Authority is puzzling. Perhaps South Dublin County Council were reluctant to broach the issue of a river-crossing at the time, due to its being a very sensitive issue with the local population? However, its omission is bad science!

Celbridge Interchange

The Celbridge interchange has been open to traffic since mid 2003. It is one of the biggest interchanges on the M4/N4, clearly designed to carry large volumes of traffic in the future. It serves the growing community of Celbridge and the many thousands of people working in the high technology sector in the vicinity of the M4. The old Celbridge Road is frequently congested with tailbacks into Celbridge village. However, congestion at the Celbridge Interchange is infrequent in comparison even at peak times. If the Celbridge Interchange were encoded in the model, traffic would therefore most likely use the N4/M4 route (via the northern section of the ORR) to the Celbridge Interchange to access the Celbridge area, rather than via the old Celbridge road, which is accessible from the Adamstown Roundabout via Adamstown. It is our opinion that its absence from the model is likely to suppress traffic which would be predicted otherwise for the northern section of the ORR.

5.1.3. M50 Upgrade

The modelling work for the M50 Upgrade EIS was carried out directly by the DTO. They used their Full Area Model for this scheme. However, none of the details relating to the zones or network nodes or links are given in the EIS. Therefore, we are unable to make an evaluation of that part of the model.
5.2. An Bord Pleanála’s Response Regarding Extent of the Road Network Encoded

5.2.1. ORR 2001
In Section 35 of his report of the oral hearing, An Bord Pleanála’s Inspector did not accept the criticisms made regarding the absence of important roads from the traffic model:

“A substantial part of the cross-examination of Council witnesses, and of the evidence by LTQL witnesses, on both Traffic and Air Quality related to the effects that suggested anomalies would have on the predictions generated by the Traffic and Air Quality Models that were used by the Council’s Consultants. While both Consultants (Mr. Dolan and Dr. Porter) supported the Traffic and Air model’s reliability under robust cross-examination, I am satisfied from the evidence given that the predictions made about the impacts, as set out in Section 6.9.9., were not affected by the difference in views expressed by the Expert witnesses on both sides about the likely effects of those anomalies.”

5.2.2. ORR 2003
In Section 40 of his report of the oral hearing, An Bord Pleanála’s Inspector did not accept the criticisms made regarding the absence of important roads—in particular, the DTO’s crossing of the River Liffey north of the Ballydowd interchange—from the traffic model:

“The issue of the non-inclusion of the River Liffey crossing was discussed during cross-examination of M/s I. Byrne and Henderson, see Section 19. 2 of this Report, when Mr. Henderson said that the possible long term crossing routes were not included in the ORR model as no decision had been reached on which of the options would be selected. Since long term road objectives are not included in the 6 year Plan in the Draft CDP, the timescale must be assumed to be at least post 2010. The location indicated for such a route in the draft CDP at Table 13.7 is for a route to the west of Adamstown SDZ, where it would seem unlikely to have a significant effect on traffic flows on the proposed road development.”
Figure 5-1: Three different Options for a Liffey crossing, presented in the ORR 2003 EIS.

5.3. **Induced Traffic**

The possibility or impact of induced traffic is discounted in all three EISes.

During the ORR 2001 Bord Pleanála oral hearing, South Dublin County Council's main traffic model witness\(^1\) stated that induced traffic was not incorporated into the traffic model on the advice of the DTO.

At the ORR 2003 Bord Pleanála oral hearing in March 2004, South Dublin County Council's main transport witness\(^2\) stated that the model did not incorporate induced traffic. In their response to submissions to An Bord Pleanála, the Consultants for SDCC, state:

> “The design did not envisage additional widening to accommodate car traffic and the restrictions on speed, weight and with traffic signals gave no scope for increased capacity over that on existing

\(^1\) Mr. Anthony Dolan (Arup Consulting).

\(^2\) Mr. Gordon Henderson (Arup Consulting).
road which made the likelihood of induced traffic very remote. Model showed Demand flows same as Actual flows and only when demand exceeded actual flow did potential for induced traffic exist."

While, on the face of it this seems reasonable, we make the following points:

1. Again, we return to the issue of the type of model used by the Consultants; namely, a non-variable demand, macrosimulation model.

2. The witness referred only to the ORR itself: "The design did not envisage additional widening to accommodate car traffic, etc." refers specifically to the ORR. However, one needs also to consider the Adamstown Link Road, and the Fonthill Link Road; two new roads in the local network, and which do not have the same constraints of several signalised junctions. These roads, included as part of the Local Authority's preferred "Option A3", link into the ORR. The comparison of model Demand flows and Actual flows appears to have been only carried out on the ORR only, and not for these new roads or on the network in general.

The M50 Upgrade EIS discusses the issue of induced traffic briefly. In Section 4.3 Volume 1, the authors list eight responses by travellers, which can arise when a road scheme is opened. These responses can result in extra mileage on the road network – called "induced traffic". They state that:

"Currently there is little firm evidence available on the contribution of each of the above listed response to overall levels of induced traffic as a result of a road scheme."

They continue, stating,

"In 1994, the UK Standing Advisory Committee on Trunk Road Assessment (SACTRA) was asked to look for such evidence but was unable to advise on this issue, although the above responses were seen as plausible and their overall net effect was accepted as being potentially significant."

Regarding the first point, there is now a considerable body of evidence supporting the existence and likely impacts of Induced Traffic. Examples include studies by the US Surface Transportation Policy Project[STPP1], [STPP2], [STPP3], by the US EPA[Noland] and others [Fulton], [DeCorla-Souza]. Litman [Litman] of the Victoria Transport Policy Insitute in Canada discusses the impact of the types of responses on induced traffic. Also, he summarises several studies dating from as early as 1972 to as recent as 2003, which, using various analysis techniques, have examined the amount of traffic generated by specific projects. Each of these studies—including the 1994 SACTRA study[SACTRA]—state that, in the long term (3+ years), more than 50% of new capacity on a road scheme is absorbed by induced traffic.

Regarding the second point from the M50 Upgrade EIS, quoted above, the 1994 SACTRA report is very specific regarding the existence of induced traffic:
Is induced traffic a real phenomenon?

"...induced traffic can and does occur, probably quite extensively, though its size and significance is likely to vary widely in different circumstances".

Does induced traffic matter?

"Studies demonstrate convincingly that the economic value of a scheme can be over-estimated by the omission of even a small amount of induced traffic. We consider that this is an issue of profound importance to the value-for-money assessment of the road programme".

When and where does induced traffic matter?

"In three sets of circumstances:

• “where the road network is operating or is expected to operate close to capacity”;
• “where the elasticity of demand with respect to travel costs is high”; i.e. where traveller responsiveness to changes in travel times or costs is high, as may occur where trips are suppressed by congestion, and then released when the network is improved.
• “where the implementation of a scheme causes large changes in travel costs". In practice this means roads in and around urban areas, river crossings and capacity enhancing inter-urban schemes including motorway widening.

In addition, SACTRA is also quite specific regarding what needs to be done:

1. “Strategic economic and environmental area-wide assessment of road schemes should be assessed as a whole rather than divided into small sections".
2. “A more sophisticated form of traffic modelling (‘variable demand methods’) should be introduced that take account of induced traffic.”

On the latter point, in November 2003, the Department for Transport in the UK began drafting advice on Induced Traffic[DfT1]. It states that this advice is “intended to replace existing Departmental guidance on Induced Traffic Appraisal (in DMRB 12.2.2) and extend the types of scheme for which the effects of variable demand on scheme benefits and the level of induced traffic WILL be estimated quantitatively.” (Note: Bolding and other punctuation are those of the Dept. for Transport).

The M50 Upgrade EIS discusses an “induced traffic test” which was carried out on
the DTO Traffic Model using the (older) Design Manual for Roads and Bridges (DMRB) advice. This test used an elasticity technique in the DTO model, rather than implementing a more sophisticated variable demand model. The authors state that “The outcome of this test demonstrated clearly that, even without demand management measures, the scale of induced traffic resulting from the Scheme would be minimal thus confirming that the traffic forecasts from the model were a reasonable basis upon which to undertake the Scheme assessment”. We make the following observations:

1. Unfortunately, neither the assumptions nor the results for this test are presented in the EIS. Therefore, we are unable to comment on how extensive was this testing.

2. It is preferable that variable demand model be used for the traffic model. However, if this is not possible, then caution should be used when excluding induced traffic, even if the scale of such traffic resulting from the scheme is expected to be small. Indeed, the 1994 SACTRA report states: “the economic value of a scheme can be over-estimated by the omission of even a small amount of induced traffic. We consider that this is an issue of profound importance to the value-for-money assessment of the road programme”.

To date, induced traffic has been considered in traffic models used for at least one project in this country, namely the EIS for N6 Kinnegad – Athlone dual carriageway[Kinnegad-EIS]. Despite the fact that that EIS elsewhere relies on the (Highways Agency’s) DMRB, the DMRB methodology for assessing induced traffic was not used. No reason was advanced as to why a reasoned methodology used in the neighbouring jurisdiction should not be entirely applicable here. Instead, a 20% increase for through-traffic from Athlone to Kinnegad was arbitrarily selected and added in to the traffic predictions. In the case of the N6, it appears that the prediction of a level of traffic above a minimum threshold was used to justify the need for the scheme. Without considering induced traffic, the road would not need to have been constructed, as the levels of traffic would not have reached that threshold!

For the ORR 2001, ORR 2003 and M50 Upgrade schemes, induced traffic is very likely to occur, since expanding an already-congested network will release suppressed demand. Indeed, the Strategic Planning Guidelines for the Greater Dublin Area briefly discuss the Outer Ring Road under “Road Proposals and Concepts” [SPGDA](page 99):

“The potential of this route to generate, rather than alleviate, additional demand for travel will require to be examined.”

However, incorporating induced traffic into the traffic models would certainly have weakened the economic arguments put forward to justify these schemes. First, it would reduce predicted congestion-reduction benefits, particularly over the longer term. Second, it would increase many external costs, particularly over the longer term due to changes in transportation choices and land-use patterns. Third, it would provide relatively small user benefits because the significant proportion of generated and induced traffic consists of vehicle trips that most consumers are
willing to forego.

5.4. An Bord Pleanála’s Response on Induced Traffic

5.4.1. Outer Ring Road 2001

In his report of the oral hearing, An Bord Pleanála's Inspector does not make any explicit reference to the issue of induced traffic, and its exclusion from the traffic model. The only reference he makes to criticisms of the traffic model are those we mentioned earlier, namely those from Section 35 of his report:

“A substantial part of the cross-examination of Council witnesses, and of the evidence by LTQL witnesses, on both Traffic and Air Quality related to the effects that suggested anomalies would have on the predictions generated by the Traffic and Air Quality Models that were used by the Council's Consultants. While both Consultants (Mr. Dolan and Dr. Porter) supported the Traffic and Air model's reliability under robust cross-examination, I am satisfied from the evidence given that the predictions made about the impacts, as set out in Section 6.9.9., were not affected by the difference in views expressed by the Expert witnesses on both sides about the likely effects of those anomalies.”

5.4.2. Outer Ring Road 2003

In his report on the oral hearing, An Bord Pleanála’s Inspector makes the following point:

“In relation to the submission that "induced traffic" should have been included in the design as advocated by SACTRA in the UK, the Council responded that since the constraints in the design gave little scope for increased capacity, which was confirmed by the model showing demand flows being the same as actual flows, the likelihood of induced traffic was remote. I consider this response to be reasonable in the circumstances outlined in the evidence at the Hearing.”

We repeat our earlier points:

1. Again, we return to the issue of the type of model used by the Consultants; namely, a non-variable demand, macrosimulation model.

2. The Council's witness referred only to the ORR itself: “The design did not envisage additional widening to accommodate car traffic, etc.” refers specifically to the ORR. However, one needs also to consider the Adamstown Link Road, and the Fonthill Link Road; two new roads in the local network, and which do not have the same constraints of several signalised junctions. These roads, included as part of the Local Authority's preferred “Option A3”, link into the ORR. The comparison of model Demand flows and Actual flows appears to have been only carried out on the ORR only, and not for these new roads or on the network in general. It
appears that the Council, and An Bord Pleanála's Inspector are concerned only with the environment on the ORR itself.

5.4.3. M50 Upgrade
In his report on the oral hearing, the Inspector does not refer to induced traffic, save to repeat the testimony of the Local Authorities' witness. The Inspector, then states:

*Having regard to the evidence in the EIS and to the design issues raised in evidence and cross-examination at the Hearing and the submissions made, I am satisfied that the adoption of the layout and geometric design parameters proposed in the M50 Upgrade Scheme were justified at the Hearing.*

He makes no effort to explain why he believes the Councils' expert traffic model witness over other expert witnesses from the general public. Also, it is not clear why An Bord Pleanála did not (does not) retain their own traffic modelling experts, which the Inspector could (can) consult on this issue.

6. Traffic Model Validation
The validation of a traffic model involves a series of tests to ensure that modelled flows compare well with actual flows. This validation process is achieved by modelling into the future from some baseline year to some future year, where there is known data, obtained from traffic surveys. The survey data is compared with the model results, and the model re-calibrated until the differences are not statistically significant. Figure 6-2 below, taken directly from the Highways Agency's Design Manual for Roads and Bridges (DMRB) [HA-DMRB], outlines the six tests that are required.

The GEH statistic referred to in this figure is a form of Chi-squared statistic, defined as follows:

\[ GEH = \sqrt{\frac{(M - O)^2}{(M + O)/2}} \]

*Figure 6-1: Definition of GEH Statistic.*

where

- M = Modelled flow
- O = Observed flow

6.1. Outer Ring Road 2001
In Appendix D, Section 3 pages 112 – 115, Volume 2 of the EIS, the validation of the Traffic Model is discussed. The Consultants only carried out two of the six
required tests. We have analysed both of these; the Link Validation results and the Journey Time Validation results, which are presented in that section of the EIS. We have also carried out the other tests, using the data supplied in the EIS. As we shall show, it is clear from our analysis, that the model does not meet a number of the Validation Acceptability Guidelines set out in the DMRB.

6.1.1. Link Validation Analysis

In Sections 3.4 and 3.5 of Appendix D, page 113, Volume 2 of the EIS, the authors discuss the comparison of Observed and Modelled flows by means of the GEH statistic. They state that:

"85% of the validation links should have a GEH statistic of less than 5"

in accordance with the guidelines for use of the GEH statistic as listed in the DMRB Volume 12. In Section 3.5 "Link Validation Results", the authors refer to their Tables of flow comparisons in Appendix B: Link Validation Results of Appendix D on Page 123 of Volume 2 of the EIS. We have reproduced here the AM peak figures from the EIS – see Table 6-1 below. The EIS states that for the AM peak model:

"83% [of all validation links have a GEH value of] less than 5"

Clearly, the result of this particular validation test is on the borderline of the DMRB’s 85% minimum guideline level. In such circumstances, the DMRB lays down additional analysis to be performed:

“A model that does not meet these guidelines may still be acceptable for appraisal of a given scheme if the discrepancies are within survey accuracies and the larger discrepancies are concentrated away from the area of greatest importance to that scheme. Conversely, a model that passes the guidelines but has significant discrepancies on the most crucial links may be unacceptable”

We have highlighted the largest discrepancies in yellow in the Table 6-1. In particular, the following links where large discrepancies occur are significant:

1. Link 14 (West of M50 Junction 10): Link to major road adjacent to the road of interest in the study area
2. Link 18 (N4 West of M50) are significant: Major Road adjacent to the road of interest in the study area
3. Link 23 U/C Ballyowen south of N4: Link on the road of interest in the study area
4. Link 25 U/C East of Esker: Link on the road of interest in the study area
5. Link 21 U/C Nangor road west of R113: Link on the road of interest in the study area

1 Paragraph 4.4.3 of Volume 12, Section 2, Part 1 of the Highways’ Agency DMRB.
It appears to us that these are sufficient in number (almost 20% of all links) and significance to warrant a re-calibration of the model. However, this was not carried out.

6.1.2. Assigned Hourly Flows Validation Tests 1 – 4

The DMRB’s “Assigned Hourly Flows” Validation Tests 1 – 4 outlined in Figure 6-2 were not carried out in preparing the traffic model for the EIS. Using the data from EIS, we performed these tests, and present the results here. These are shown at the bottom of Table 6-1 for the AM Peak time-period. In particular, Test #1 specifies that, in greater than 85% of cases, individual modelled hourly flows on links should be within 15% of observed hourly flows where the flows are in the range 700 – 2700 vph. It can be seen from this table that, only 72% of modelled flows are within 15% of the observed for flows in the range 700 – 2700 vph. This is considerably less than the 85% threshold specified in the DMRB. Flows of 700 – 2700 vph make up almost half (43%) of all flows for the AM Peak hour, used in the validation exercise, making it important that this test be passed.

![Figure 6-2: Validation Acceptability Guidelines from the Highways' Agency DMRB.](image)

Table 4.2: Assignment Validation: Acceptability Guidelines

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<td>Assigned Hourly flows * compared with observed flows</td>
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<td>1. Individual flows within 15% for flows 700 - 2,700 vph</td>
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<td>2. Individual flows within 100 vph for flows &lt; 700 vph</td>
<td>&gt; 85% of cases</td>
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<td>3. Individual flows within 400 vph for flows &gt; 2,700 vph</td>
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<tr>
<td>4. Total screenline flows (normally &gt; 5 links) to be within 5%</td>
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<td>5. GEH statistic:</td>
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<td>i) individual flows : GEH &lt; 5</td>
<td>&gt; 85% of cases</td>
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<td>ii) screenline (+) totals: GEH &lt; 4</td>
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<td>+ Screenlines containing high flow routes such as Motorways should be presented both including and excluding such routes</td>
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* links or turning movements (but see Paragraph 4.4.37).
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<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Westbound</td>
<td>858</td>
<td>838</td>
<td>1.0</td>
<td>1.0%</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>22</td>
<td>WC E of Rockhouse</td>
<td>Eastbound</td>
<td>858</td>
<td>838</td>
<td>1.0</td>
<td>1.0%</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Westbound</td>
<td>858</td>
<td>838</td>
<td>1.0</td>
<td>1.0%</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>23</td>
<td>WC E of Rockhouse</td>
<td>Eastbound</td>
<td>858</td>
<td>838</td>
<td>1.0</td>
<td>1.0%</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Westbound</td>
<td>858</td>
<td>838</td>
<td>1.0</td>
<td>1.0%</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>24</td>
<td>WC E of Rockhouse</td>
<td>Eastbound</td>
<td>858</td>
<td>838</td>
<td>1.0</td>
<td>1.0%</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Westbound</td>
<td>858</td>
<td>838</td>
<td>1.0</td>
<td>1.0%</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>25</td>
<td>WC E of Rockhouse</td>
<td>Eastbound</td>
<td>858</td>
<td>838</td>
<td>1.0</td>
<td>1.0%</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Westbound</td>
<td>858</td>
<td>838</td>
<td>1.0</td>
<td>1.0%</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>26</td>
<td>WC E of Rockhouse</td>
<td>Eastbound</td>
<td>858</td>
<td>838</td>
<td>1.0</td>
<td>1.0%</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Westbound</td>
<td>858</td>
<td>838</td>
<td>1.0</td>
<td>1.0%</td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>

Table 6-1: ORR-2001 Link Validation Results: AM Peak Base Year Model 1999 – All Vehicles. Data coloured blue, red and green indicate flows of 700 – 2700 vph, less than 700 vph and greater than 2700 vph, respectively.
6.1.3. Journey Time Comparison

In Section 3.6, the authors discuss the Journey Time Validation Results. Test #6 in the DRMB gives acceptability guidelines for modelled journey times compared with observed times. This states that the modelled times should be within 15% (or 1 minute, if higher) for greater than 85% of routes. The results, from the EIS, for both AM Peak and Off Peak times are reproduced here in Table 6-2 and Table 6-3 respectively, with each table also containing our analyses of those results. It can clearly be seen in these tables that the percentage of modelled routes with differences within 15% (or 1 minute, if higher) is 50% in both AM Peak and Off Peak cases. This is far lower than the 85% minimum guideline as specified by the DMRB.

<table>
<thead>
<tr>
<th>Route</th>
<th>Surveyed Times (tS)</th>
<th>Modelled Times (tM)</th>
<th>Difference in s</th>
<th>% Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>N7 Wbd: M50/N7 to Saggart</td>
<td>8 22 502</td>
<td>8 14 494</td>
<td>8 2</td>
<td></td>
</tr>
<tr>
<td>N7 Ebd: Saggart to M50/N7</td>
<td>18 5 1085</td>
<td>9 2 542</td>
<td>543</td>
<td></td>
</tr>
<tr>
<td>R113 Nbd: N81/ R113 to N4/R113</td>
<td>29 20 1760</td>
<td>34 32 2072</td>
<td>-312</td>
<td></td>
</tr>
<tr>
<td>R113 Sbd: N4/R113 to N81/R113</td>
<td>26 12 1572</td>
<td>29 43 1783</td>
<td>-211</td>
<td></td>
</tr>
<tr>
<td>N81 Wbd: M50/N81 to N7 Citywest</td>
<td>11 56 716</td>
<td>9 31 571</td>
<td>145</td>
<td></td>
</tr>
<tr>
<td>N81 Ebd: N7/Citywest to M50/N81</td>
<td>11 53 713</td>
<td>13 26 806</td>
<td>-93</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Route</th>
<th>Surveyed Times (tS)</th>
<th>Modelled Times (tM)</th>
<th>Difference in s</th>
<th>% Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>N7 Wbd: M50/N7 to Saggart</td>
<td>8 27 507</td>
<td>7 10 430</td>
<td>77</td>
<td></td>
</tr>
<tr>
<td>N7 Ebd: Saggart to M50/N7</td>
<td>9 18 555</td>
<td>7 43 463</td>
<td>95</td>
<td></td>
</tr>
<tr>
<td>R113 Nbd: N81/ R113 to N4/R113</td>
<td>18 50 1130</td>
<td>18 24 1104</td>
<td>26</td>
<td></td>
</tr>
<tr>
<td>R113 Sbd: N4/R113 to N81/R113</td>
<td>16 38 998</td>
<td>17 31 1051</td>
<td>-53</td>
<td></td>
</tr>
<tr>
<td>N81 Wbd: M50/N81 to N7 Citywest</td>
<td>9 14 554</td>
<td>10 53 653</td>
<td>-99</td>
<td></td>
</tr>
<tr>
<td>N81 Ebd: N7/Citywest to M50/N81</td>
<td>9 52 592</td>
<td>12 13 733</td>
<td>-141</td>
<td></td>
</tr>
</tbody>
</table>

Total No. of Routes 6
No. Modelled routes with Diff. < 15% or < 1 Min. 3
% Modelled routes with Diff. < 15% or < 1 Min. 50%
DMRB Minimum Acceptability Guideline 85%
Result Fail

Table 6-2: Analysis of AM Peak Journey Time Comparison Results showing failure to meet DMRB Guidelines.

<table>
<thead>
<tr>
<th>Route</th>
<th>Surveyed Times (tS)</th>
<th>Modelled Times (tM)</th>
<th>Difference in s</th>
<th>% Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>N7 Wbd: M50/N7 to Saggart</td>
<td>8 27 507</td>
<td>7 10 430</td>
<td>77</td>
<td></td>
</tr>
<tr>
<td>N7 Ebd: Saggart to M50/N7</td>
<td>9 18 555</td>
<td>7 43 463</td>
<td>95</td>
<td></td>
</tr>
<tr>
<td>R113 Nbd: N81/ R113 to N4/R113</td>
<td>18 50 1130</td>
<td>18 24 1104</td>
<td>26</td>
<td></td>
</tr>
<tr>
<td>R113 Sbd: N4/R113 to N81/R113</td>
<td>16 38 998</td>
<td>17 31 1051</td>
<td>-53</td>
<td></td>
</tr>
<tr>
<td>N81 Wbd: M50/N81 to N7 Citywest</td>
<td>9 14 554</td>
<td>10 53 653</td>
<td>-99</td>
<td></td>
</tr>
<tr>
<td>N81 Ebd: N7/Citywest to M50/N81</td>
<td>9 52 592</td>
<td>12 13 733</td>
<td>-141</td>
<td></td>
</tr>
</tbody>
</table>

Total No. of Routes 6
No. Modelled routes with Diff. < 15% or < 1 Min. 3
% Modelled routes with Diff. < 15% or < 1 Min. 50%
DMRB Minimum Acceptability Guideline 85%
Result Fail

Table 6-3: Analysis of Off Peak Journey Time Comparison Results showing failure to meet DMRB Guidelines.
6.2. Outer Ring Road 2003
Although the validation data for the ORR-2003 is slightly better than the ORR-2001 EIS, the traffic model witness for the Local Authority, a member of the DTO, accepted that, as with the ORR-2001 EIS, the traffic model failed to meet all of the minimum Validation Acceptability Guidelines as set out in the DMRB.

6.2.1. Inconsistency of SATURN Software Versions Used
The DTO validation certificate for the traffic model is dated, 16th July 2003. This implies that the SATURN software used for validation was version 10.3, since the SATURN website states that the version 10.4 of the software was realised in early November 2003. However, in information received under the Freedom of Information Act by LTQL, prior to the March 2004 hearing, and as stated by the traffic modelling witness for the DTO at the oral hearing, the version used for the actual modelling work was the newer version 10.4.

New versions of any software most commonly arise as a result of bug-fixes and modifications. This is no different for the SATURN software, as can be determined from reading the information on the SATURN website. However, such changes to software can very often reveal further bugs, or lead to inconsistent or different behaviour for a modelling tool.

It is highly imprudent therefore to use a different version of a modelling tool for validation than the version used for modelling, irrespective of the purpose of the model. In the case of the DTO's SATURN model, this is particularly important, as the configuration used by the DTO is extremely complex, as stated by the DTO witness at the hearing. The witness further asserted that the use of a different version of the software for the validation compared with the model runs would make little difference. However, it is a generally accepted fact in computer science circles that there would be no way of knowing this (i.e. whether new bugs or behaviour arising from the differences in versions would or would not lead to inconsistencies). The use of two different versions certainly raises questions about the validity and accuracy of predictions made by the model. The significance of using different versions of the software for validation and model runs should not be underestimated.

6.3. M50 Upgrade
Details of the model-validation are not presented in this EIS. This is in contrast to the ORR-2001, ORR-2003 EISs and at the Adamstown SDZ Oral Hearing where details of the model validation results were presented. On this basis alone, it is difficult to comment on the efficacy of the traffic model validation.

6.4. An Bord Pleanála's Response
6.4.1. Outer Ring Road 2001
The Inspector, in his report did not accept the criticism of the validation of the model. Instead, he stated that there was disagreement between the experts:
“A substantial part of the cross-examination of Council witnesses, and of the evidence by LTQL witnesses, on both Traffic and Air Quality related to the effects that suggested anomalies would have on the predictions generated by the Traffic and Air Quality Models that were used by the Council's Consultants. While both Consultants (Mr. Dolan and Dr. Porter) supported the Traffic and Air model's reliability under robust cross-examination, I am satisfied from the evidence given that the predictions made about the impacts, as set out in Section 6.9.9., were not affected by the difference in views expressed by the Expert witnesses on both sides about the likely effects of those anomalies.”

6.4.2. Outer Ring Road 2003
We can find no reference in the Inspector's report of the oral hearing as to his view of the Model Validation data. Regarding the use of different versions of the SATURN software for carrying out the validation and the actual traffic flow forecasts, the Inspector does not accept the criticisms raised at the hearing:

“The LTQL group questioned the accuracy of the local model used, which was based on the DTO SATURN Model, as there were differences between the versions of SATURN used for verification and prediction and a number of links LTQL suggested should have been modelled were not included but Mr. Byrne of the DTO, who had certified the validity of the local model, considered the differences were so minimal they would not affect the predictions. (See Section 19.2 of this Report) The Council's response to criticisms of the local model used was that the primary purpose of this model was to test the capacity of the junctions in the proposed design and that the 2003 proposal was not designed on a "predict and provide" basis but rather on a basis of constraining traffic while offering a choice of alternative modes. Having regard to the evidence and cross-examination given at the Hearing, I am satisfied that the traffic predictions made in the EIS are adequate for assessing the effects of traffic on the environment.”

7. Traffic Model Predictions
In this section, notwithstanding our reservations regarding the type of modelling software used, the extent of the road network encoded in the models and the model validation carried out, we briefly discuss some of the predictions made by the traffic models for each of the EISes.

7.1. Estimation of Computational and Statistical Errors
Neither computational error-estimates for the model predictions nor statistical errors for the base-line data are presented in any of the EISes studied for this work. This information is essential when comparing forecasts for the Do Something and Do Minimum scenarios. Without knowing the error bounds on the data, it is difficult to make meaningful comparisons.
7.2. Outer Ring Road 2001
In Section 6.99 "Summary of Traffic Assessment", the authors state the impact for Lucan residents of completing the ORR as follows:

"Of particular relevance is the predicted traffic increases on the existing ORR link from Balgaddy to the N4 which would result in a local major negative impact" [EIS Report Authors' bolding of text].

In addition, the EIS makes a virtue of the fact that in its traffic forecast the ORR will relieve the M50 of traffic. This is evident from paragraph 3, page 147, Volume 1:

"One of the major impacts of the ORR is to reduce traffic on the M50. This is not surprising as the ORR runs parallel to the M50 providing additional capacity for north to south traffic movements in the study area"

and from EIS Table 6.2, Row 20 "U/C Ballyowen South of N4", Volume 1. This is reiterated in Mr. Dolan's evidence to the oral hearing in Paragraph 3.31, where he states

"The provision of the ORR is expected to generally increase traffic on the N4 (flow locations 1, 2 and 35), especially on the section between the ORR and the M50. This is a result of traffic having re-assigned from the parallel M50 route."

In Table 3.2, Page 18 of Mr. Anthony Dolan's evidence, again from the oral hearing, the Annual Average Daily Traffic (AADT) flows in PCUs are given. We reproduce a portion of that table with some accompanying analysis in Table 7-1 below. From this, it is clear that the percentage increases in traffic predicted for the immediate vicinity of the ORR in Lucan for the Do-Something scenario compared with the Do-Minimum scenario are very large. In addition, traffic along the Belgard Road SN7 shows a marked increase.

<table>
<thead>
<tr>
<th>No</th>
<th>Location</th>
<th>2004</th>
<th>2019</th>
<th>% Increase</th>
<th>2004</th>
<th>2019</th>
<th>% Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>Belgard Road SN7</td>
<td>25100</td>
<td>32500</td>
<td>29%</td>
<td>20500</td>
<td>31200</td>
<td>52%</td>
</tr>
<tr>
<td>26</td>
<td>Penny Hill to Ballyowen</td>
<td>11000</td>
<td>35000</td>
<td>218%</td>
<td>13600</td>
<td>36000</td>
<td>165%</td>
</tr>
<tr>
<td>27</td>
<td>Ballyowen to Fonthill Rd</td>
<td>18400</td>
<td>28300</td>
<td>54%</td>
<td>15700</td>
<td>28600</td>
<td>82%</td>
</tr>
<tr>
<td>30</td>
<td>Lucan Newlands Road west of ORR</td>
<td>1500</td>
<td>2400</td>
<td>60%</td>
<td>800</td>
<td>4600</td>
<td>475%</td>
</tr>
</tbody>
</table>

Table 7-1: Annual Average Daily Traffic Flows in PCUs for locations near the ORR for the years 2004, 2019 with percentage Increases in Do Something Traffic compared with Do Minimum Traffic in each case.

7.3. Outer Ring Road 2003
7.3.1. Traffic Flow Predictions
The non-technical summary states that:
“Traffic volumes are predicted to reduce for the section of Ballyowen Road between Pennyhill Junction and the N4 with the scheme in place, while volumes between the Pennyhill and Balgaddy Junctions are predicted to increase...”

However, when one examines the actual figures as presented in the Table 7-2 and Table 7-3, it is clear that the traffic reduction mentioned is very small, at only 2%. We question whether the numerical accuracy of the traffic model allows a distinction to be made between the two traffic figures for Do Minimum and Do Something scenarios that particular modelled year of 2019. At the same time, the predicted traffic increases are very large indeed, and would most likely cause a reduction in the quality of life for local people as they endeavour to move around their community.

<table>
<thead>
<tr>
<th>Year</th>
<th>Link</th>
<th>2004</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Do Minimum</td>
<td>Do Something</td>
<td>% Difference (Do Something vs Do Minimum)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Balgaddy – Pennyhill</td>
<td>800</td>
<td>9300</td>
<td></td>
<td>1063%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pennyhill – Ballyowen</td>
<td>8100</td>
<td>10000</td>
<td></td>
<td>23%</td>
<td></td>
</tr>
</tbody>
</table>

Table 7-2: Annual Average Daily Traffic (AADT) Predictions for the Do Minimum and Do Something Scenarios for the modelled year of 2004, with percentage differences.

<table>
<thead>
<tr>
<th>Year</th>
<th>Link</th>
<th>2019</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Do Minimum</td>
<td>Do Something</td>
<td>% Difference (Do Something vs Do Minimum)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Balgaddy – Pennyhill</td>
<td>5700</td>
<td>14100</td>
<td></td>
<td>147%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pennyhill – Ballyowen</td>
<td>16000</td>
<td>15700</td>
<td></td>
<td>-2%</td>
<td></td>
</tr>
</tbody>
</table>

Table 7-3: Annual Average Daily Traffic (AADT) Predictions for the Do Minimum and Do Something Scenarios for the modelled year of 2019, with percentage differences.

7.3.2. Operational Capacity of Junctions
In Section 5.3.3, Volume 2, “Traffic Performance Criteria”, it is stated that “The maximum Ratio of Flow to Capacity (RFC) of any normal approach to a junction should not ideally exceed 90% of its theoretical capacity.” However Table 5.3, page 54 in the EIS shows the values of the RFC for Balgaddy and Ballyowen Junctions, in particular, exceed this value. It was stated at the oral hearing by witnesses for SDCC, that the junctions would still be able to operate at these levels of capacity.

7.4. ORR-2001 compared with ORR-2003
The Inspector, in his report on the ORR-2003 EIS compares the traffic predictions
in that EIS with those from the ORR-2001 EIS. He states:

“In my Report on the 2001 Hearing a Table is given which sets out the then current and predicted flows on the Pennyhill to Ballyowen and Ballyowen to N4 sections. This is reproduced here with the 2004 predictions, taken from Table 5.2 in the EIS, added and given in bold type.”

We have reproduced the Inspector’s table here – see Table 7-4 below. There are a number of interesting aspects to this data, to which the Inspector does not actually refer. These are:

- In the case of the ORR-2003 EIS, the 2001 base year data is higher for the Pennyhill to Ballyowen section of ORR than the predicted Do Minimum data for 2004.
- The Do Minimum data from ORR-2001 EIS and ORR-2003 EIS are considerably different, particularly for the design year, 2019! The differences for 2019 are of the order of 10,000 PCU AADT.

Given the continuing house-building in the area, we suggest that the projected decrease in traffic flows from 2001 to 2004 along Pennyhill to Ballyowen is unlikely to be an accurate forecast.

The Do Minimum scenarios in the two EISes are identical in all respects; including public transport infrastructure provision, Adamstown development, etc. While one would expect some differences in the predictions for the Do Minimum for each EIS, since two different base years are used, these differences should be small. Differences of 10,000 PCU AADT are anomalous, and raise serious questions regarding the accuracy of the model forecasts.

<table>
<thead>
<tr>
<th>Year</th>
<th>Action</th>
<th>Ballyowen to N4</th>
<th>Penny Hill to Ballyowen</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999</td>
<td>Base year</td>
<td>15300 AADT</td>
<td>8500 AADT</td>
</tr>
<tr>
<td>2001</td>
<td>Base year</td>
<td>18900 AADT</td>
<td>8600 AADT</td>
</tr>
<tr>
<td>2004 (ORR-2001)</td>
<td>Do Minimum</td>
<td>19300 AADT</td>
<td>11000 AADT</td>
</tr>
<tr>
<td>2004</td>
<td>Do Minimum</td>
<td>21300 AADT</td>
<td>8100 AADT</td>
</tr>
<tr>
<td>2004 (ORR-2001)</td>
<td>Do Something</td>
<td>27700 AADT</td>
<td>35000 AADT</td>
</tr>
<tr>
<td>2004</td>
<td>Do Something</td>
<td>15000 AADT</td>
<td>10000 AADT</td>
</tr>
<tr>
<td>2019 (ORR-2001)</td>
<td>Do Minimum</td>
<td>23800 AADT</td>
<td>26300 AADT</td>
</tr>
<tr>
<td>2019</td>
<td>Do Minimum</td>
<td>33700 AADT</td>
<td>16000 AADT</td>
</tr>
<tr>
<td>2019 (ORR-2001)</td>
<td>Do Something</td>
<td>26000 AADT</td>
<td>36000 AADT</td>
</tr>
<tr>
<td>Year</td>
<td>Action</td>
<td>Ballyowen to N4</td>
<td>Penny Hill to Ballyowen</td>
</tr>
<tr>
<td>------</td>
<td>--------------</td>
<td>------------------</td>
<td>-------------------------</td>
</tr>
<tr>
<td>2019</td>
<td>Do Something</td>
<td>25000 AADT</td>
<td>15700 AADT</td>
</tr>
</tbody>
</table>

Table 7-4: Comparison of traffic predictions from ORR-2001 EIS and ORR-2003 EIS, taken from Inspector's report.

7.5. M50 Upgrade

We have analysed the differences in traffic flows on the M50 mainline sections for the Do Something scenario compared with the Do Minimum scenario for both opening year (2008) and operational year (2023). This is presented here in Table 7-5 and Table 7-6; traffic flows given in those tables are Annual Average Daily Traffic (AADT) in Passenger Car Units (PCU). It is clear from these data that the traffic forecasts for the proposed scheme show a considerable increase in traffic using the M50 mainline compared with the Do Minimum scenario. This is hardly surprising given the increased capacity of the proposed scheme. Table 4.4, Volume 1 of the EIS, shows the “Effects on other roads” of the scheme for both 2008 and 2023. However, these data are given as percentages, so it not possible to determine how large the effects are in terms of traffic flows.

Frequently, benefits of a scheme are presented in EISes in terms of increased average speed on the network. Figures 4.3a, 4.3b, Volume 1 of the EIS, showing “Average Traffic Speed on Radial Routes approaching M50 from Outside” predict higher average speed for the Do Something scenario for 2008 and 2023, respectively, for 10 of the 12 routes examined (in both years). However, the predictions for “Average Traffic Speed on Radial Routes from Outside M50 to City Centre”, particularly for 2023 (Figure 4.4b, Volume 1), show that, for 8 of the 12 routes, the Do Minimum is marginally better. As already mentioned, there are no error-estimates included for the data, so it is difficult to draw definitive conclusions from this information.
Table 7-5: Comparison of AADT traffic flows, in PCUs, on the M50 for the Do Something and Do Minimum scenarios for 2008 AM Peak.

<table>
<thead>
<tr>
<th></th>
<th>2008</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Do Min</td>
<td>Do Some</td>
<td>Actual Difference</td>
<td>% Difference</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(Do Some vs Do Min)</td>
<td>(Do Some vs Do Min)</td>
<td></td>
</tr>
<tr>
<td>M1 – Ballymun</td>
<td>88000</td>
<td>152400</td>
<td>64400</td>
<td>73%</td>
<td></td>
</tr>
<tr>
<td>Ballymun – N2</td>
<td>113400</td>
<td>190900</td>
<td>77500</td>
<td>68%</td>
<td></td>
</tr>
<tr>
<td>N2 – N3</td>
<td>124900</td>
<td>210500</td>
<td>85600</td>
<td>69%</td>
<td></td>
</tr>
<tr>
<td>N3 – N4</td>
<td>137800</td>
<td>216800</td>
<td>79000</td>
<td>57%</td>
<td></td>
</tr>
<tr>
<td>N4 – N7</td>
<td>134300</td>
<td>202400</td>
<td>68100</td>
<td>51%</td>
<td></td>
</tr>
<tr>
<td>N7 – Ballymount</td>
<td>130300</td>
<td>190100</td>
<td>59800</td>
<td>46%</td>
<td></td>
</tr>
<tr>
<td>Ballymount – N81</td>
<td>1205000</td>
<td>166100</td>
<td>45600</td>
<td>38%</td>
<td></td>
</tr>
<tr>
<td>N81 – Scholarstown</td>
<td>117000</td>
<td>150000</td>
<td>33000</td>
<td>28%</td>
<td></td>
</tr>
<tr>
<td>Scholarstown – Ballineteer</td>
<td>123600</td>
<td>145900</td>
<td>22300</td>
<td>18%</td>
<td></td>
</tr>
<tr>
<td>Ballineteer – Sandyford</td>
<td>112400</td>
<td>99000</td>
<td>-13400</td>
<td>-12%</td>
<td></td>
</tr>
<tr>
<td>Sandyford – Carrickmines</td>
<td>89500</td>
<td>97900</td>
<td>8400</td>
<td>9%</td>
<td></td>
</tr>
<tr>
<td>Carrickmines – Laughanstown</td>
<td>84800</td>
<td>87900</td>
<td>3100</td>
<td>4%</td>
<td></td>
</tr>
<tr>
<td>Laughanstown – M11</td>
<td>64300</td>
<td>66100</td>
<td>1800</td>
<td>3%</td>
<td></td>
</tr>
</tbody>
</table>

Table 7-6: Comparison of AADT traffic flows on the M50 for the Do Something and Do Minimum scenarios for 2023 AM Peak.

<table>
<thead>
<tr>
<th></th>
<th>2023</th>
<th></th>
<th>Actual Difference</th>
<th>% Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Do Min</td>
<td>Do Some</td>
<td>(Do Some vs Do Min)</td>
<td>(Do Some vs Do Min)</td>
</tr>
<tr>
<td>M1 – Ballymun</td>
<td>76600</td>
<td>152900</td>
<td>76300</td>
<td>100%</td>
</tr>
<tr>
<td>Ballymun – N2</td>
<td>106100</td>
<td>191100</td>
<td>85000</td>
<td>80%</td>
</tr>
<tr>
<td>N2 – N3</td>
<td>119600</td>
<td>210000</td>
<td>90400</td>
<td>76%</td>
</tr>
<tr>
<td>N3 – N4</td>
<td>132000</td>
<td>213600</td>
<td>81500</td>
<td>62%</td>
</tr>
<tr>
<td>N4 – N7</td>
<td>133300</td>
<td>214600</td>
<td>81300</td>
<td>61%</td>
</tr>
<tr>
<td>N7 – Ballymount</td>
<td>130600</td>
<td>202900</td>
<td>72300</td>
<td>55%</td>
</tr>
<tr>
<td>Ballymount – N81</td>
<td>122800</td>
<td>189000</td>
<td>66200</td>
<td>54%</td>
</tr>
<tr>
<td>N81 – Scholarstown</td>
<td>123900</td>
<td>172400</td>
<td>48500</td>
<td>39%</td>
</tr>
<tr>
<td>Scholarstown – Ballineteer</td>
<td>130600</td>
<td>166200</td>
<td>35600</td>
<td>27%</td>
</tr>
<tr>
<td>Ballineteer – Sandyford</td>
<td>114900</td>
<td>120200</td>
<td>5300</td>
<td>5%</td>
</tr>
<tr>
<td>Sandyford – Carrickmines</td>
<td>130800</td>
<td>132900</td>
<td>2100</td>
<td>2%</td>
</tr>
<tr>
<td>Carrickmines – Laughanstown</td>
<td>127800</td>
<td>134800</td>
<td>7000</td>
<td>5%</td>
</tr>
<tr>
<td>Laughanstown – M11</td>
<td>102100</td>
<td>131900</td>
<td>29800</td>
<td>29%</td>
</tr>
</tbody>
</table>
7.6. An Bord Pleanála's Response regarding Traffic Model Predictions

7.6.1. Outer Ring Road 2001
While the Inspector did mention in his report a number of benefits of the proposed scheme, his conclusions regarding the impacts of proposal were as follows:

“In the context of that level of an increase in traffic on the Existing road, immediately beyond the northern termination point of the New Road section proposed to be constructed as part of the proposed Road Development, and having regard to the fact that no detailed mitigation measures to reduce the Major Negative Impact on that section immediately north of Balgaddy Roundabout were made available to the Hearing, nor was a likely time scale for the identification of such measures given, I have formed the opinion, from the evidence available on the impact that would effect the environment, that the Council have not justified their case for approval of the Road Development as it was proposed.”

His final recommendation states:

“Based on the submissions made about the EIS and taking into account the evidence given at the Hearing, I now recommend that the Road Development should be modified by the deletion of the section of Single Carriageway Road between the Proposed Adamstown Roundabout and the Existing Balgaddy Roundabout, for the reason that this will remove the cause for the Local Major Negative Impact predicted in the EIS for the location immediately north of the Balgaddy Roundabout.

“I also recommend that a further modification should be included which provides that no new road should be constructed northwards from the Adamstown Roundabout until after a Road Development Proposal and Environmental Impact Statement shall have been prepared for the entire route of such a road from Adamstown Roundabout to the N4, so that any impact on the area of the road will be fully assessed.”

7.6.2. Outer Ring Road 2003
As stated previously, the Inspector, in his report on the ORR-2003 EIS compares the traffic predictions in that EIS with those from the ORR-2001 EIS. He states:

“In my Report on the 2001 Hearing a Table is given which sets out the then current and predicted flows on the Pennyhill to Ballyowen and Ballyowen to N4 sections. This is reproduced here with the 2004
predictions, taken from Table 5.2 in the EIS, added and given in bold type.”

We reproduced the Inspector’s table earlier in this report – see Table 7.4. Regarding the data in that table, the Inspector makes the following observations regarding the traffic model predictions:

“This Table shows that with the proposed scheme in place there are reductions on some sections in the predicted traffic flows by comparison with what would be the case if the proposed road was not proceeded with, and also by comparison with the previous proposal. It has to be noted however that from Table 5.2 for the section between Pennyhill and Balgaddy, traffic flows in the proposed scheme show substantial increases over what would be there if the proposed road development did not proceed. eg --

9300 AADT v 800 AADT in 2004 for Do something / Do minimum
14100 AADT v 5700 AADT in 2019 for Do something / Do minimum

“An examination of Table 5.2 in the EIS shows that, in general, predicted flows for the 2004 and 2019 do something scenarios show reductions on the Ballyowen Roundabout to N4 section, increases on the Pennyhill to Balgaddy section and a re-distribution of west to east traffic movements on Esker Lane/Willsbrook Road /Ballyowen Park Road, Castle Road and Griffeen Avenue. These predictions were discussed in detail during the Hearing (See Sections 17.1, 17.4, 17.6 & 19.2 of this Report) with Mr. Henderson referring to the greater choice being made available by the link to the south which the Balgaddy to Adamstown link would provide for local residents.”

7.6.3. M50 Upgrade
In his report on the oral hearing, the Inspector does not specifically refer to the traffic forecasts, save for a reference to the need for demand management measures at some future date following the opening of the scheme:

“Having regard to the details given in the EIS and to the evidence and submissions at the Hearing, I am satisfied that some form of specific demand management measures will have to be introduced on the Upgraded M50 corridor if the objectives set out in Sections 1.1 & 4.15 in Volume 1 of the EIS, and summarised in Mr. Corcoran’s evidence on page 38 of this Report, are to be maintained over the design life of the proposed Upgrade Scheme.”

8. Implementation of the Outer Ring Road Schemes
The Outer Ring Road granted permission following the ORR-2001 EIS has already
been completed. The design of the road is broadly as set out in the ORR-2001 EIS, save for the later addition of additional bus-lanes.

Phase 3 of the ORR, granted permission following the hearing into ORR-2003 EIS, is currently under construction. We have studied the road layout design at the Construction-Contractor’s site office, and discussed these with one of their Engineers. The design is different to that indicated in the EIS in a number of respects mainly in relation to cycling facilities, as follows:

1. On-road cycle-lanes, 1.5m wide adjacent to a 3.0 m bus-lane on each side of the road are being constructed, rather than off-road cycle-tracks.

2. The dedicated pedestrian bridge across the N4, is a pedestrian-only bridge, not a pedestrian/cyclist bridge; i.e. it does not have cycle-tracks. Instead, the on-road cycle-lanes are continued onto the vehicular bridge, and cyclists are expected to cycle with the vehicular traffic.

9. **Pedestrian Modelling**

No pedestrian modelling has been carried out for any of the EISs. This is particularly surprising for the case of both Outer Ring Road EISs. Both of these EISs discuss the potential of the proposed scheme to cause “Community Severance”. However, save for counting the increased number of traffic-light controlled pedestrian crossings required, there does not appear to be any scientific method used to quantify the change in the number of pedestrian movements which may result from the proposed scheme. Pedestrian modelling would allow an analysis of the potential effects of the road on pedestrian movements. It should have been employed.

10. **Alternatives Considered**

10.1. **Outer Ring Road 2001**

One page of the EIS is devoted to “Alternatives Considered” (page 28, Volume 1). Of that page, only one paragraph discusses the issue of alternatives:

“The corridor of the Outer Ring Road has been reserved on the Development Plan since 1973. The purpose of the road is to link the existing towns of Clondalkin, Tallaght and Lucan, and to service the significant areas of land zoned for residential and industrial development. A review was undertaken of the alternative corridors which would service this need. However, due to significant development in the South Dublin County Area in recent decades there were no clear corridors identified which would provide a feasible alternative to the existing reserved corridor.”

The remainder of page 28 of the EIS makes reference to the “do-minimum” scenario—i.e. the scenario where the scheme is not progressed—but concludes that:
“If the ORR were not to be progressed, development of housing, industrial and amenity facilities in South Dublin County would be seriously curtailed.”

10.1.1. Compliance with European Law

Article 5, Paragraph 3 of European Directive 85/337/EEC as amended by Directives 97/11/EC and 2003/35/EC, informally known as the EIA directive [85/337/EEC] lists “The information to be provided by the developer in accordance with paragraph 1”, to include:

“an outline of the main alternatives studied by the developer and an indication of the main reasons for his choice, taking into account the environmental effects”

Given its inclusion in the section entitled “Alternatives Considered”, one can draw the conclusion that the Local Authority believes that the Do Minimum scenario can be adequately considered as an alternative. We do not concur with this belief. By default, all schemes have, at minimum, two options: “Do Something” or “Do Minimum” (sic. Do Nothing). In any proposed scheme, the Do Minimum is not one of several possible means of achieving the stated objectives! For example: one does not achieve a stated objective of providing a transport link between communities by not providing a transport link between communities! Therefore, it is absurd to consider the Do Minimum as a valid alternative in the context of the legislation.

The Local Authority appears to state that they did not consider any alternative routes for the road whatsoever. If they did consider alternatives, they certainly did not provide in the EIS, an outline of the main ones and an indication of the main reasons for their choice. Also, it is unclear whether they considered any alternatives for the proposed route, in terms of alternative transport options, such as a public-transport-only corridor, be it bus or light-rail. If they did, an outline of these main alternatives is not provided in the EIS.

Considering the foregoing points alone, it is our opinion that the EIS is in breach of Article 5 of the directive 97-11-EC on the basis of not having considered alternatives.

10.2. Outer Ring Road 2003

Section 3.4 of Volume 2 of the EIS deals with alternatives considered, and covers seven pages. Besides the Do-Minimum (sic. Do Nothing) option, which we do not consider a valid alternative, all six Do Something options incorporate the completion of the link from the Adamstown roundabout to Balgaddy (i.e. the original ORR route), with various different local improvements to the existing ORR (Balgaddy to N4). These local improvements consist of different possible types of carriageway with or without bus priority and cycle routes, plus the possible addition of links from the Adamstown roundabout eastwards and/or westwards. See below or Figure 3.1 of Volume 2 of the EIS. It is worth noting that all “alternatives” incorporate the link between the Adamstown roundabout and existing Balgaddy
roundabout.
During the Bord Pleanála oral hearing a number of objectors questioned the adequacy of the EIS on the basis that real alternatives were not addressed.

10.3. M50 Upgrade
In contrast to the ORR-2001 and ORR-2003 EISes, the M50 EIS does consider alternatives to the proposed scheme. The main alternatives are described in Section 4.3 Volume 1 along with the main reasons for the choice of pursuing the upgrade. In this regard, we conclude that the EIS complies with Article 5, Paragraph 3 of the EIA Directive.

10.4. An Bord Pleanála’s Response Regarding Alternatives Considered

10.4.1. Outer Ring Road 2001
In his report of the oral hearing, An Bord Pleanála's Inspector appears to accept the reason given by the Local Authority for why no true alternatives were considered. He refers to this issue first in Section 32 (of his report):

“The only alternative considered was the option of not proceeding with the Road, referred to as the "Do minimum" option, and the reasons for this are outlined in page 28 of the EIS and discussed in the evidence and cross-examination of M/s Coffey, O'Byrne and Higgins. The corridor for the ORR had been reserved for over 20 years on Development Plans and development that had taken place adjacent to the corridor constrained the choice available to the authority in considering alternatives. This was also one of the main points raised in the General Submissions in Section 29 of this Report and the option to use a corridor that had been reserved since the 1970s formed a significant part of the evidence and cross-examination at the Hearing.”

and, later in Section 34:

“The introduction in the EIS outlines the extent of the scoping exercise undertaken as part of it's preparation and it also details the constraints that existed in examining alternatives in the context of the extent of development that had already taken place in the area. Having regard to the comments made by the various responding Agencies, and to the wording in the 1999 Regulations, I consider that, in adopting the route identified as a corridor in the 1998 Development Plan as the option to be assessed in the EIS, the Council complied with the requirements of the 1999 Regulations and that the EIS is, therefore, valid. Accordingly, as previously referred to in Section 32, I am satisfied that the EIS, as submitted to An Bord
The Inspector’s reference to “General Submissions” concerns an alternative route which was included in approximately 7,500 “pro-forma” submissions to An Bord Pleanála, prior to the hearing, and which was suggested in a number of submissions by members of the public who attended the hearing. This alternative route was not constrained by development which had taken place along the Local Authority’s corridor, and could have been considered by them in the preparation of the EIS. In addition, we note that South Dublin County Council did have the option of considering an alternative to roadway for their chosen route; i.e. Light-rail or tram. It also had the option of considering the alternative of a bus-only route. On this basis, it is our view that the EIS is inadequate, and also that the Inspector did not carry out a meaningful assessment for the purposes of Article 5, Paragraph 3 of the EIA Directive.

10.4.2. Outer Ring Road 2003

In his report of the oral hearing, An Bord Pleanála's Inspector essentially dismisses criticisms regarding alternatives considered, made at the hearing, that the EIS is inadequate. His report states:

“During the Hearing a number of objectors questioned the adequacy of the EIS on the basis that alternatives were not addressed, particularly since this had been an issue in the previous Hearing. The alternatives considered are detailed in Section NTS4.2 in Volume 1 (Non-technical summary) and Section 3.4 in Volume 2 of the EIS and were further discussed in Mr. McDaid’s evidence and cross-examination in Section 18 of this Report. The alternatives considered were (1) the "Do-Minimum" option which assumed no link was provided between the Adamstown and Balgaddy Roundabouts and that the existing road from Balgaddy to the Lucan Road remained in its “as is” layout and (2) the "Do-Something" option which assumed the completion of the link from Adamstown to Balgaddy. For the Do-Something option a number of different options including variations in the road cross-section between Adamstown and the N4 in combination with additional routes to the east and west were considered. I am satisfied that the issue of “alternative routes” was adequately addressed in the EIS and at the Hearing.”

As is apparent from the above quotation, the Inspector does not provide any reasoned argument to explain why he believes that the issue of alternative routes was adequately addressed. On this basis, it is our view that the Inspector did not carry out a meaningful assessment for the purposes of Article 5, Paragraph 3 of the EIA Directive.
11. Public Consultation and Access to Information

11.1. Outer Ring Road 2003

As part of its public consultation, South Dublin County Council produced a brochure outlining their various options for the Outer Ring Road. An extract from this brochure is reproduced in Figure 11-1. We make the following observations about this brochure and the content of the EIS:

1. In Section 3.4.1 of the EIS, the Do Minimum option:
   - “assumes no link is provided between the ORR Adamstown Roundabout and Balgaddy”

2. However, this is in contrast to the public consultation brochure where the Do Minimum scenario—“Option A1”—is described as:
   - “Extension of a single carriageway link from Adamstown Roundabout to Balgaddy Roundabout. Adamstown Link Road to be constructed as part of the Adamstown Area Development. Signalised Traffic junctions to replace roundabouts on existing road.” considered to be the option to build a 2-lane road between the Balgaddy roundabout and the Adamstown roundabout. The do minimum scenario in the public consultation also proposed to change existing roundabouts to signal controlled junctions on the existing section of road between the Balgaddy roundabout and the Interchange at Woodies on the N4. See figure 3.4 of the EIS.

3. In section 3.4.8 of the EIS, the authors refer to the public consultation version of the Do Minimum, where, they state:
   - “Of those who expressed a preference, 3.6% (of overall) opted for the do-minimum (see Options A1, Section 4.2)”

This use of the term “Do Minimum” to mean two different things was likely to cause great confusion amongst the general public and professionals alike.

Section 3.4.8 of the EIS summarises the responses to the public consultation. They are reproduced here in Table 11-1.

In relation to the above we have the following comments:

1. Less than 1% expressed a preference for the “Option A3”, which is the option ultimately chosen by the Local Authority. South Dublin County Council refer to this as the “preferred” option, but clearly it is not the public's preference.

2. The total percentage breakdown of submissions to the public consultation process does not add to 100%. It appears that there are 16.2% of the responses unaccounted for. When South Dublin County Council were questioned regarding this at the oral hearing, no explanation could be given.
Table 11-1: Public preferences to the various options presented by South Dublin County Council during the public consultation phase on the Adamstown Roundabout to N4 Scheme (ORR-2003).

<table>
<thead>
<tr>
<th>Option</th>
<th>Public Preference</th>
</tr>
</thead>
<tbody>
<tr>
<td>No preference for any option presented, supported scheme not proceeding or use alternative route.</td>
<td>59%</td>
</tr>
<tr>
<td>Option A1</td>
<td>3.6%</td>
</tr>
<tr>
<td>Option A2</td>
<td>2%</td>
</tr>
<tr>
<td>Option A3 (South Dublin County Council's preferred option)</td>
<td>1%</td>
</tr>
<tr>
<td>Option B1</td>
<td>2%</td>
</tr>
<tr>
<td>Option B2</td>
<td>8.1%</td>
</tr>
<tr>
<td>Additional link to Newcastle Road</td>
<td>2.7%</td>
</tr>
<tr>
<td>Additional link to Celbridge road</td>
<td>5.4%</td>
</tr>
<tr>
<td><strong>Total percentage</strong></td>
<td><strong>83.8%</strong></td>
</tr>
<tr>
<td><strong>Preference unaccounted for in EIS</strong></td>
<td><strong>16.2%</strong></td>
</tr>
</tbody>
</table>

Table 11-1: Public preferences to the various options presented by South Dublin County Council during the public consultation phase on the Adamstown Roundabout to N4 Scheme (ORR-2003).

Figure 11-1: Various options for the Adamstown Roundabout to N4 Scheme (ORR-2003) presented in a public consultation brochure by South Dublin County Council.
11.2. M50 Upgrade

11.3. Access to the EIS

Given the nature, size and the geographical area of impact of this scheme, one can reasonably argue that it will have a profound effect on the population of the entire Dublin region. For these reasons, we feel that the cost for the hard-copy version of the EIS documents, at €120, was unreasonable. For a tiny fraction of the overall costs of the proposed scheme, and in the interests of transparency and public participation in the overall consultation process, the EIS should have been made available free of charge. Whilst, the EIS was available on CDROM disk at a lower price, the proportion of homes with computers in the Dublin region is estimated to be less than 60%. Ironically, those with the resources to pay for a hard-copy version of the EIS are most likely to be in this latter category of people also. Consequently, it is entirely possible that a large proportion of the adult population in the region did not have reasonable access to these important documents.

For those with access to the CDROM version, the security properties of the EIS PDF documents, as shown in Figure 11-2, prevent the reader from performing either “Content Copying or Extraction” and “Content Extraction for Accessibility” from these documents. Restricting content copying or extraction prevents copying text for pasting into a word processor, which hinders the preparation of submissions on the EIS. However, more importantly, restricting content extraction for accessibility means that the content of the file cannot be read out loud by text to speech programs, and also cannot be captured and rendered by programs that increase the size of the fonts. The hard-copy version of the EIS uses predominantly a serif font (Times Roman) of small size (12pt or less). However, serif fonts make reading extremely difficult for people with various disabilities, including those with visual impairment or dyslexia. Combined with the small size of the font, this means that the soft-copy version is the only means of access to the EIS for this category of people. The soft-copy restrictions imposed therefore greatly hinders this access.

Regarding the files on the CDROM, one of these, entitled “Volume 05_01.pdf” was corrupt on the CDROM disk, and had to be downloaded from South Dublin County Council’s website. All files should have been checked prior to production of the CDROM.
Figure 11-2: The Document Properties of the EIS PDF, showing “Content Copying or Extraction: Not Allowed” and “Content Extraction for Accessibility: Not Allowed”, thus preventing copying text for pasting into a word processor and also preventing the content of the file being read out loud by text to speech programs, or being captured and rendered by programs that increase the size of fonts.
Conclusions and Recommendations

Conclusions
We outline, in the table below, our conclusions by addressing a number of key questions regarding the EISs and the EIA process.

<table>
<thead>
<tr>
<th>#</th>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Does the EIS cover the appropriate geographical scope (i.e. all areas affected)?</td>
<td>Yes for the two ORR EISs. No for the M50 Upgrade EIS:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Model predictions are not presented for much of the area surrounding the M50, eventhough it is these areas which will be impacted by the capacity-changes on the M50 and its interchanges.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• The EIS states that demand-management measures may be implemented at some future time following the opening of the scheme. However, the nature and effects on the M50 and surrounding areas of these measures are not included in the EIS.</td>
</tr>
<tr>
<td>2</td>
<td>Are all important issues identified in the EIS?</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Induced traffic is ignored</td>
</tr>
<tr>
<td>3</td>
<td>Does the EIS include sufficient baseline data?</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• No zonal maps for ORR-2001 and M50 EIS.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• No network maps in any of the EISs.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• No validation data for M50 Upgrade.</td>
</tr>
<tr>
<td>4</td>
<td>Are all important baseline data quantified?</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• A number of important links are not included in the model</td>
</tr>
<tr>
<td>5</td>
<td>Are interpretations of data correct?</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Not in all cases, particularly when differences between predictions for Do Something and Do Minimum are small, due to the absence of error bounds on the predictions.</td>
</tr>
<tr>
<td>6</td>
<td>Does the EIS predict all relevant likely impacts?</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Induced traffic is ignored</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• No scientific methodology is employed to quantify the level of community severance of the schemes in ORR-2001 and ORR-2003.</td>
</tr>
<tr>
<td>7</td>
<td>Are important impacts properly quantified?</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• M50 Upgrade: no traffic flow data for surrounding road network</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Ditto ORR-2003 – the capacity of the scheme is constrained by four sets of traffic lights from Balgaddy to Ballyowen. This will encourage significant rat-running along Griffeen Road, which runs parallel to the ORR. Traffic from Griffeen</td>
</tr>
</tbody>
</table>
Table 0-1: Conclusions: answers to some important questions

### Recommendations
1. Employ microsimulation traffic models
2. Incorporate induced traffic into model in accordance with International best practice
3. Implement proper controls regarding the version/revision of modelling software used for validation and for model runs. Without exception, the same version/revision should be used for both aspects of the modelling process.
4. Include traffic model validation results in EIS along with all necessary tables of data for independent analyses
5. Include network and zonal maps in EIS
6. Provide baseline data-sets to allow independent modelling
7. Provide all validation data, baseline and forecast data-sets, network and zonal maps on CDROM accompanying EIS
8. Perform PM peak model predictions. This can be achieved with microsimulation models.
9. Determine estimates for computational errors for model predictions and statistical errors for the base-line data in EIS. Provide consequent error bounds for the model predictions.
10. Perform a proper empirical analysis of policy implementation to determine a “rate of advancement of policy initiatives” in an Irish context. Use this to derive a likely-case scenario for public transport and other infrastructural initiatives, instead of using the aspirational best-case scenario.
11. Calculate likely opening year of scheme, and perform and present model predictions for that year. Proposed opening year of scheme should not be year in which the oral hearing is held!
12. Provide free EIS documents to the public. The number obtained by the public is usually relatively low, so the costs are not prohibitive; particularly in comparison with the costs of the schemes.
13. Soft-copy documents should allow: “Content Copying or Extraction” and in particular “Content Extraction for Accessibility”. The latter is required for accessibility for readers with special needs. Granting these accessibility rights would mean that the content of the file could be read out loud by text to speech programs, or could be captured and rendered by programs that increase the size of the fonts.
14. Nature of Assessment by An Bord Pleanála: there appears to be a lack of critique by An Bord of DTO evidence; in fact, unquestioning acceptance of DTO eventhough they are protagonists in the case for the proposed scheme in the EISs. An Bord should employ its own traffic modelling experts, independent of DTO, and make them available to Inspectors.
12. References


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[Paramics1]: Paramics microsimulation: http://www.sias.co.uk/sias/homepage.html and http://www.sias.co.uk/sias/s-paramics/fronpage2.html

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