Appendices

Appendix 1
Celbridge Stakeholder Workshops – invited Stakeholders

Celbridge Stakeholder Workshop 1
Invited Stakeholders

Council Members:
Kevin Byrne
Geraldine Conway
Katie Ridge

Transport Operators:
Mr. Tom Finn, Iarnrod Eireann
Mr. Derry O'Leary, Dublin Bus
The Manager, Circleline Bus, Maynooth
John Kearns, Kearns Bus
Celbridge Cabs
M.C.I. Cabs Ltd

Disabled Groups:
The Manager, St Raphael's Campus
Frank Mulcahy, Kildare Network of People with Disabilities
Partially Sighted/Blind, NCBI Head Office
Irish Wheelchair Association

Gardai:
Sgt Gabriel McCabe, Celbridge Garda Station

Schools:
Frances Kelliher, Principal, Glebe Junior Montessori School
Rita Galvin, Principal, North Kildare Educate Together School,
Maria Barry, Principal, St. Wolstan's Community School
The Principal, Salesian College
The Principal, Scoil Mochua Aghard's N S
The Principal, Primrose Hill NS
The Principal, St Raphael's Special School,
The Principal, Scoil Bríd, Main Street,
The Principal, Scoil Na Mainistreach
The Principal, Scoil Mochua

Other Groups
Abbey Farm Residents Association, Celbridge
Thornhill Court Residents Association
Crodaun Forest Park Residents Association
David Trost – Celbridge Community Council
Chief Fire Officer, Central Fire Station, Newbridge
Ambulance Officer, Naas County Hospital, Naas
Head Librarian, Celbridge Library
Dr. Peter Moran, Main St., Celbridge
Dr. Gerard Waters, Maynooth Road, Celbridge
Erin Cotter, RTP National Co-ordinator, Rural Transport Programme, POBAL

Appendix 2
Celbridge Safer Routes to Schools Questionnaire

Scoil Na Mainistreach
School Travel Questionnaire

Transportation Planning (International) Ltd. (TPi) is working with Kildare County Council to improve transport within Celbridge. As part of this work, Scoil Na Mainistreach was selected for a pilot safer routes to school project, which if successful will be extended to other schools in Celbridge. At this stage we are collecting information on current travel to the school and problems with travel to the school. We would appreciate if you could complete this questionnaire and return it to Scoil Na Mainistreach before 23rd November 2007. If you have more than one child at the school, please complete a questionnaire for each child.

1. Where do you live?
   (Choose a 'ZONE' from the plan on the reverse of this sheet)

   ZONE ☐

2. How far does your child travel to school?

   ☐ Less than 0.5km ☐ 5km
   ☐ 1km ☐ 6km
   ☐ 2km ☐ 7km
   ☐ 3km ☐ 8km
   ☐ 4km ☐ More than 8.5km

3. How does your child usually travel to school?
   (Tick one box)

   ☐ Walk with an adult ☐ Walk with friends
   ☐ Bicycle ☐ Car
   ☐ Taxi ☐ Bus
   ☐ Combination - specify ☐

4. How does your child usually return home from school?
   (Tick one box)

   ☐ Walk with an adult ☐ Walk with friends
   ☐ Bicycle ☐ Car
   ☐ Taxi ☐ Bus
   ☐ Combination - specify

5. If your child does not walk to school, please tell us the reasons why? *(Tick all boxes that apply)*

   ☐ (a) Weather conditions ☐ (e) Child is too young
   ☐ (b) Road safety concerns ☐ (f) Personal safety concerns
   ☐ (c) It is too far ☐ (g) Child prefers to cycle
   ☐ (d) Don't like walking ☐ (h) Other - specify

6. If your child does not cycle to school, please tell us the reasons why? *(Tick all boxes that apply)*

   ☐ (a) Weather conditions ☐ (f) Child is too young
   ☐ (b) Road safety concerns ☐ (g) Too much to carry
   ☐ (c) It is too far ☐ (h) Personal safety concerns
   ☐ (d) Don't like cycling ☐ (i) Child prefers to walk
   ☐ (e) No parking for bicycles ☐ (j) Other - specify

7. Would you be willing to car share/lift share with other families with children at this school?

   ☐ Yes ☐ No

8. What class is your child in at this school?

   ☐ Junior Infant ☐ Third Class
   ☐ Senior Infant ☐ Fourth Class
   ☐ First Class ☐ Fifth Class
   ☐ Second Class ☐ Sixth Class

9. Do you have other children at this school?

   ☐ Yes ☐ No

10. Do you have children at other schools in Celbridge?

    ☐ Yes ☐ No

11. Has your child been involved in an accident whilst traveling to or from this school during the last 12 months?

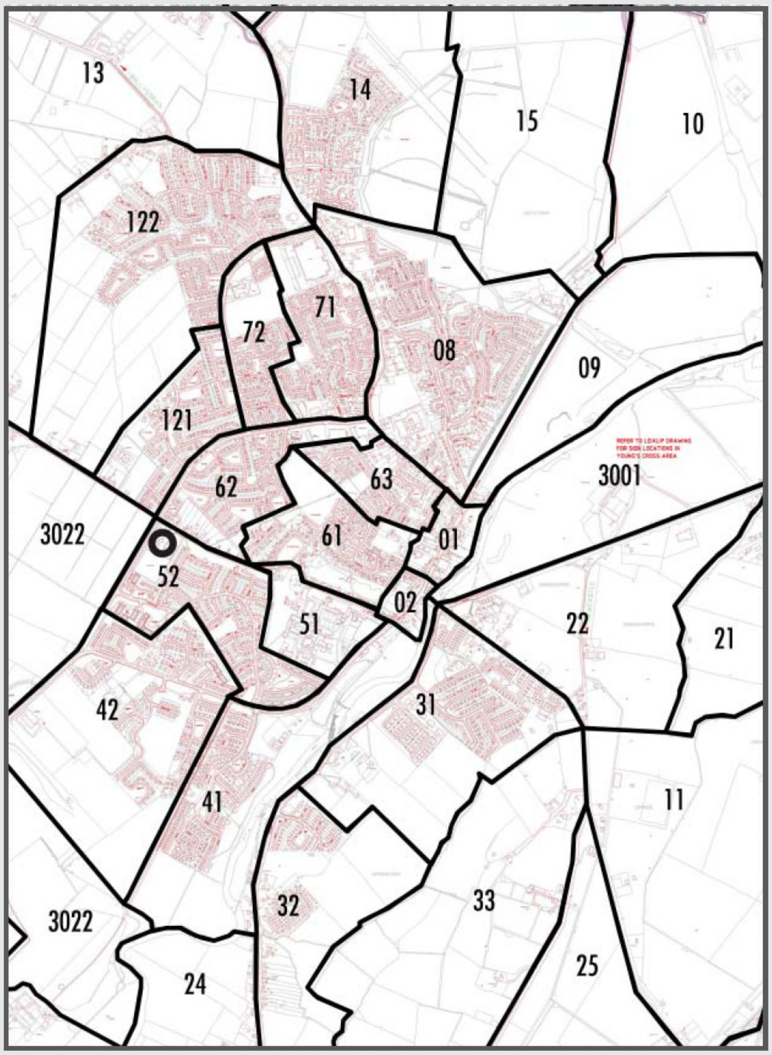
    ☐ Yes ☐ No

12. Does your child have any disability that affects the way that they travel to school?

    ☐ Yes ☐ No

Please continue on the reverse of this sheet

Where do you live? - use the zone number below to answer Question 1.



Scoil Na Mainistreach

13. Are there any particular locations on your child's route to school that you feel could be made safer?
(if Yes, provide details in the table below)

☐ Yes ☐ No

Location	Concern

Thank you for completing this questionnaire

Appendix 3
Traffic Modelling

Introduction
This Appendix sets out the approach taken in producing a traffic model for Celbridge. The scope of the model is to represent traffic conditions during AM Peak, PM Peak hours for an average 'neutral month' weekday in 2007.

The Saturn Assignment/Simulation Computer Package
SATURN is a dynamic, congested assignment and simulation model. It operates by loading a matrix of zone-to-zone origin-destination (O/D) trip movements onto a link and junction (node) network. The O/D trips are assigned to network routes taking into account the travel time, distance and congestion delay costs of using each route. SATURN functions by performing a number of iterations, whereby zone-to-zone routings are adjusted and traffic between each origin and destination may be loaded onto several different routes.

The end-state of each model run is an 'equilibrium assignment', in which, taken together, all trips in the network are assigned onto the lowest cost routes. This end-state is a reasonable reflection of how traffic distributes through a network in reality.

Outputs from the assignment model include link flows and junction turning movements, least cost zone-to-zone paths and journey times along particular network routes (with delays and distance travelled). This information can be readily compared against observed data in order to calibrate/validate the model.

The SATURN package can also be used for 'matrix estimation', whereby unobserved O/D movements in the model trip matrix can be synthesised on the basis of traffic counts.

Model Network
The Celbridge study area has been represented as full 'simulation' network. This incorporates detailed layouts of links and junctions. The extent of the Celbridge SATURN network is shown in Figure. The network structure allows detailed modelling of the layout and operation of all key junctions, within the simulation area. Checks have been made on the network configurations defined in the SATURN models, to ensure there is proper connectivity, consistent link distances and speeds and realistic capacities and permitted manoeuvres.

Zoning System
Trip origins and destinations in the model area have been allocated to a zoning system comprising 42 zones (Figure). Movements between these 42 zones constitute the SATURN trip matrix. Key characteristics of the model zones are:

- 33 zones are internal to the study area; and
- 9 zones are external to the study area.

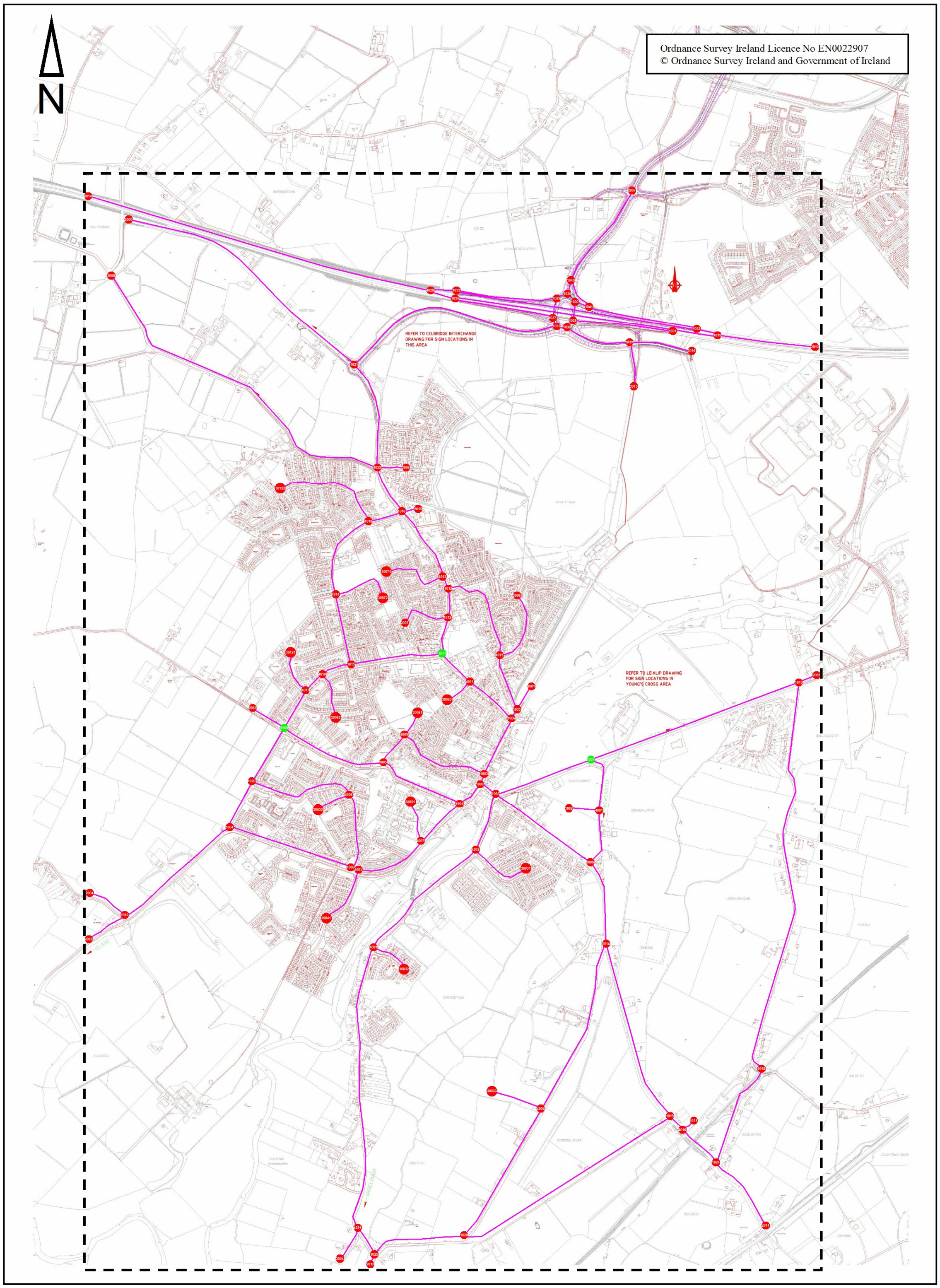


Figure 20: Extent of the Saturn Model Network, Celbridge

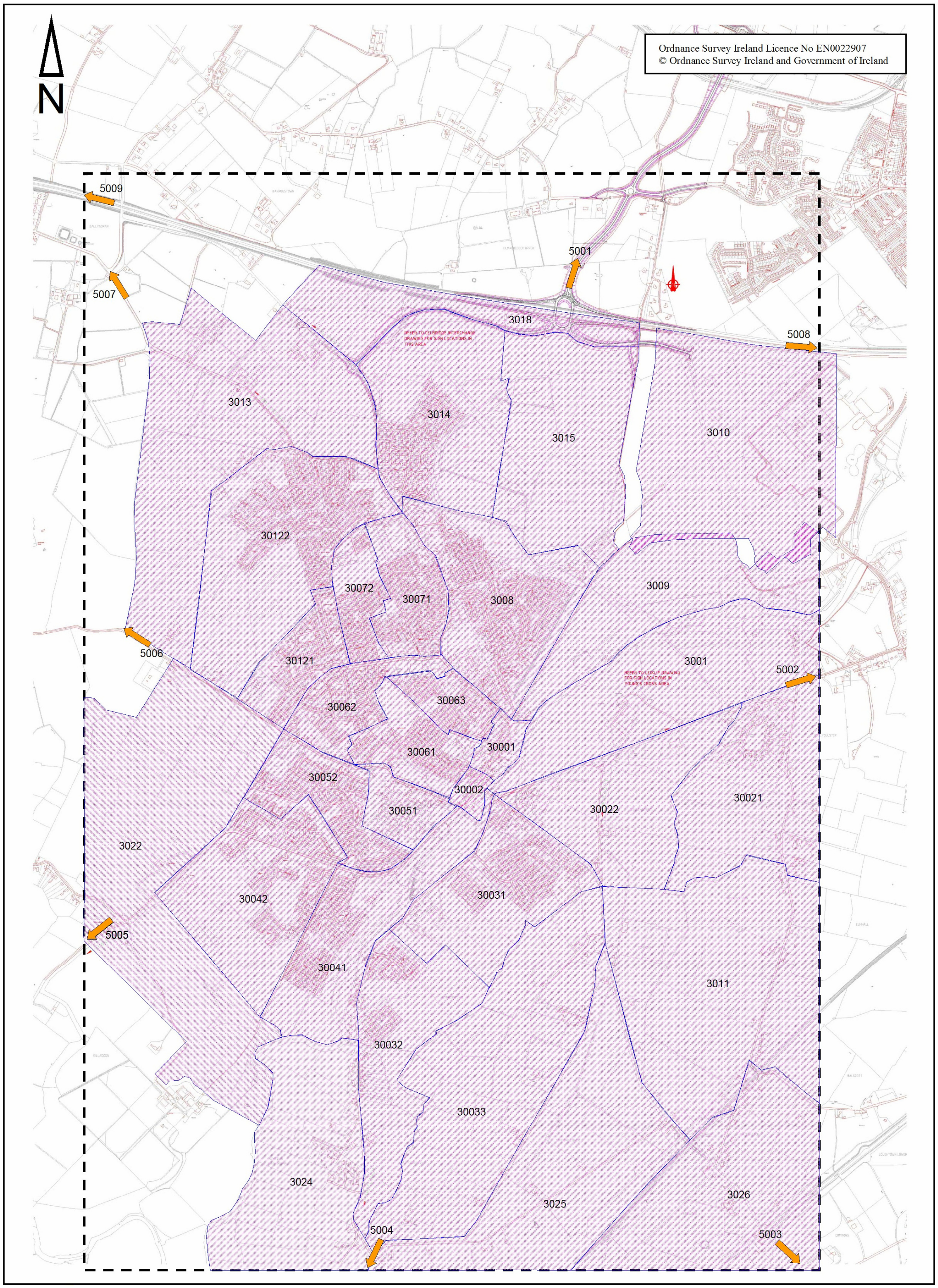


Figure 21: Saturn Model Zoning, Celbridge

The structure of the zoning system has been matched to the content of the model network, striking a balance between having zones that are sufficiently:

- Fine to represent true trip start and end points, trip routings and journey distances, give accurate results in the flow calibration and avoid too many trips within zones ('intra-zonal'); and,
- Coarse for the level of detail in the model network, the information from the O/D surveys, the future land use planning data and the modelling resources available.

Modelling Approach and Assumptions
Given that no previous traffic model or trip matrix was available for use in the Celbridge Study, there was a need to obtain a considerable amount of new traffic flow and O/D information.

Newly collected count data has been used for model building as well as for checking (calibrating) the base year output. Hence, parts of the model 'validation' discussed in this report should really be considered as 'calibration'.

Assignment of the base year 2007 all-vehicle trip matrix onto the SATURN network has been carried out using a 'Stochastic Equilibrium Assignment' technique. The method assumes that some drivers are likely to deviate away from the least cost route as is likely to happen in reality. The alternative 'Wardrop Equilibrium' approach, which assumes that drivers behave rationally, making their route choice between origin and destination on the principle of minimising travel costs has not been used in this study.

Generalised travel cost, for each O/D trip movement in the base model, comprises a time and distance element. A conventional weighting of unit time cost, relative to unit distance cost, has been used in this study. This weighting is equivalent to a time cost of 2p per minute and a distance cost of 1p per kilometre.

Numbers of trips by different vehicle categories in the SATURN trip matrix have been converted to all-vehicle PCU's using the following factors:

- Car/light goods vehicle = 1.0 pcu;
- Medium goods vehicle = 1.5 pcu;
- Heavy goods vehicle = 2.3 pcu; and
- Bus/coach = 2.0 pcu.

Calibration of the base SATURN model has required the calculation of a 'GEH error statistic'. The GEH is an accepted measure of the correspondence between observed and modelled data. It indicates the accuracy of certain calibration measurements and makes allowance for the fact that an apparently considerable difference between two large flows can be insignificant in terms of percentage difference. Conversely, it takes account of the fact that an apparently large percentage difference between two small flows can be insignificant in absolute terms. The GEH statistic has been used in the calibration of trip matrices, network flows and network journey times in the Celbridge model. GEH is calculated according to the following formula:

$$\text{GEH} = \sqrt{\left[\frac{(\text{observed} - \text{modelled})^2}{(\text{observed} + \text{modelled}) \times 0.5}\right]}$$

Use has been made of speed/flow/capacity parameters in the simulation network. This gives a more accurate representation of route capacity and travel cost on roads where an upstream link is more restricted than its downstream junction. Accepted speed flow parameters have been used, categorised by road type, which correspond to parameters contained in COBA.

Two representative average weekday time periods were selected for modelling in SATURN at base year 2007, namely:

- AM peak hour 08:00 – 09:00; and
- PM peak hour 17:00 – 18:00.

Matrix Development
Trips in the base model are derived from an amalgamation of trip O/D records collected by cordon registration plate survey and parking surveys carried out on 14th June 2007. Registrations were recorded from a sample of vehicles passing the sites listed in Section 3.8, and shown on Figure 9.

The analysed O/D records were coded to the SATURN model zones and the sample was expanded to the level of flows observed through the sites on the day of the survey.

SATURN Prior Trip Matrix
The O/D trip totals in the SATURN prior matrices were (in PCU's):

- AM peak hour 08:00 – 09:00 - 3714 pcu; and
- PM peak hour 17:00 – 18:00 - 4522 pcu.

As expected the PM prior matrix contained the most trips. The PM peak O/D movements were about 22% greater than in the AM peak.

Matrix Estimation

The SATURN matrix estimation option (SATME2) has been used to infill a number of missing, unobserved O/D cell values in the base trip matrix. This technique was applied, even though matrix estimation is not an optimum method to 'infill' cell values, (DMRB, Volume 12, Section 2, Part 1). The reasons for this decision were:

- Matrix estimation is the easiest and most efficient method of representing unobserved O/D movements;
- The cell values that are infilled by matrix estimation are only important for representing the correct volumes of base year flow on specific links; they do not need to be accurate O/D's, because all critical corridor movements have been extracted from the registration plate survey; and
- There are sufficient traffic counts available to enable matrix estimation to work effectively.

SATURN matrix estimation operates by 'seeding' empty O/D cells with a specified number of prior trips, then by identifying logical zone-to-zone routes that pass through observed count locations and finally by matching the trip movements in the matrix to the counted volumes at particular links and junctions along these routes.

Parameters used in the SATURN matrix estimation (SEED and XAMAX) were derived after numerous sensitivity test runs and were determined on the basis of achieving the best matrix calibration against observed traffic counts.

Traffic count inputs to the matrix estimation process were all from 2007 surveys,. The sources of the count data are documented in the Report of Transport Surveys and comprised:

- 2007 classified turning counts at junctions – 8 sites (RPS);
- 2007 classified and turning counts at junctions – 2 sites (Abacus);
- 2007 automatic traffic counts – 5 sites (RPS); and
- 2007 automatic traffic counts – 6 sites (Abacus).

All traffic inputs for matrix estimation were checked for consistency between upstream and downstream flows.

Base Year 2007 Calibrated Trip Matrix

The 2007 prior matrix was loaded on to the SATURN network for AM and PM peak periods. Matrix estimation (SATME2) was then undertaken. Output (2007) synthesised matrices were produced with O/D trip totals as shown in Table 14.

Time Period	**Total Matrix Trips (PCU's)**		
	Before SATME2	**After SATME2**	**% increase with SATME2**
AM peak hour 8am – 9am	3714	4286	+ 15%
PM peak hour 5pm – 6pm	4522	4766	+5%

Source: TPi
Table 14: Base Matrix Trip Totals Before/After Matrix Estimation (SATME2)

It can be seen that matrix estimation increased the volume of trips in each matrix by more no more than 15% and is to be reasonable and justifiable for the following reasons:

- The calibration of full matrix movements against observed counts is accurate;
- Most of the internal trips in the model area were absent from the prior matrix, because they were unobserved and therefore needed to be estimated; and
- The pattern of 10 largest zone-to-zone movements after matrix estimation appears sensible.

Accuracy of the estimated matrix O/D movements has been assessed, by comparing matrix trip volumes against target counted flows. A good level of accuracy was achieved, as indicated by the high proportion of matrix movements with a GEH of 5.0 or less. The calibration results were as shown in Table 15.

SATURN Model Period	**% of O/D movements with GEH ≤ 5.0**
AM peak hour	97%
PM peak hour	96%

Source: TPi
Table 15: Calibration of Estimated Matrix Trips against Target Counts

An analysis has been made of the 10 largest zone-to-zone O/D movements in the AM and PM peak trip matrices after matrix estimation. A summary of the trip movements is provided in Table 16 and Table 17 for the respective time period.

OD Number	Origin Description	Destination Description	Traffic Flow (pcu/hr)
1	Ballymakealy Area	N4/Leixlip	112
2	Wolstan Haven Area	N4/Leixlip	103
3	Wolstan Haven Are	Hazelhatch Road	93
4	Wolstan Haven Area	Dublin Road	85
5	Castletown Area	N4/Leixlip	84
6	N4/Leixlip	Castletown Area	76
7	Hazelhatch Road	Dublin Road	72
8	N4/Leixlip	Wolstan Haven Area	71
9	Clane Road	St Raphaels Area	66
10	Clane Road	N4/Leixlip	59

Source: TPi
Table 16: AM Peak 2007 – 10 Largest O/D Movements After Matrix Estimation

OD Number	Origin Description	Destination Description	Traffic Flow (pcu/hr)
1	N4/Leixlip	Castletown Area	235
2	Hazelhatch Road	Dublin Road	167
3	N4/Leixlip	Crodaun Area	98
4	Castletown Area	Wolstan Haven Area	91
5	Hazelhatch Road	N4/Leixlip	88
6	N4/Leixlip	St Raphaels Area	87
7	Wolstan Haven Area	N4/Leixlip	84
8	St Raphaels Area	N4/Leixlip	71
9	Hazelhatch Road	Main Street Area	70
10	N4/Leixlip	Ballymakealy Area	65

Source: TPi
Table 17: PM Peak 2007 – 10 Largest O/D Movements After Matrix Estimation

It can be seen from Table 16 and Table 17 that in the AM the majority of trips are travelling from an origin within the study to a destination outside the study area. Conversely, it can be seen that during the PM the majority of trips are travelling from an origin outside the study area to a destination within the study area. This is to be expected as the journey purpose of these trips is likely to be commuter traffic as more employment opportunities exist outside the study area than within.

Model Calibration Model Convergence

Acceptable stability and convergence means that if the model was to be run through further iterations, then the outputs would not change significantly, in terms of assigned flows, route journey times, congestion and travel costs. Stability and convergence are important, because they affect the reliability of other stages of the scheme appraisal. In technical terms, a stable and converged model is one which has achieved a satisfactory 'equilibrium assignment'. Appropriate measures for judging model convergence and stability are defined in DMRB Volume 12 (Section 2, Part 1, Chapter 4, Table 4.1). These criteria have been applied to the Celbridge AM and PM peak SATURN models.

Flow stability was assessed by monitoring the SATURN ‘P’ parameter, or the proportion of assigned link flows that were within 5% of the volume recorded during the preceding model iteration. In each of the AM and PM peak base models, a high ‘P’ value of over 98% was achieved on the final SATURN iteration. The DMRB criterion is for 95% of flows to be within 5% of the previous iteration.

Cost minimisation and optimum trip routing was checked by monitoring ‘Delta’, the percentage difference between the travel costs on the assigned routes and on the minimum cost routes. In each model time period, a ‘Delta’ value of 0.0% was achieved on the final iteration. The DMRB criterion is for ‘Delta’ to be less than 1%.

The convergence and stability tests showed that the Celbridge base model is reliable and performs better than the DMRB criteria in all time periods.

Network Flow Calibration
Conformity between travel times in the SATURN model and on the observed road network are important, because the modelled journey times determine the following:

- The correct route choice for trips between each origin and destination zone;
- The potential for traffic re-assignment if route speed is reduced; and
- The travel costs that are input to economic evaluation.

A key indicator of the dependability of the Celbridge traffic model is how well the modelled network flows compare against observed counts. Assigned traffic movements in the model have been extracted as ‘actual’ flows, rather than ‘demand’ flows. This means that flows that arrive at certain points in the network during each model period, (rather than all trips contained in the O/D matrix), have been compared against counted flow. This comparison is realistic, because it takes account of traffic that is queued up at congested points in the network.

DMRB Flow Validation Criteria
It is expected that a reliable Highway Traffic Model should pass several validation tests. These tests are defined in DMRB volume 12 (Section 2, Part 1, Chapter 4, Table 4.2) and have been applied to the AM and PM Peak Saturn Highway Models.

The flow validation tests applicable to the Celbridge highway model are:

- Test 1 – the total percentage of assigned flows in each model that have a ‘GEH’ value of 5.0 or less, when compared to observed counts, should be 85%; and
- Test 2 – for movements less than 700 pcu/hr, the proportion of flows modelled within 100 PCU/HR of observed should be 85%.

The main findings from the flows validation are:

Test 1
The total percentages of assigned flows in each model that have a ‘GEH’ value of 5.0 or less, when compared to observed counts, are as follows (target = 85%)

- AM peak – 89%; and
- PM peak – 91%.

Test 2
For movements less that 700 pcu/hr, the proportions of flows modelled within 100 pcu/hr of observed are as follows (target = 85%):

- AM peak – 96%; and

- PM peak – 97%.

As regards the calibration tests for different flow volumes, it can be seen that each of the base models performs well, with at least 89% of modelled flows achieving the DMRB criteria in each case.

Journey Time Routes
A selection of network routes was surveyed for travel time characteristics, so as to give a broad coverage of different O/D trip movements, journey distances and road types. The routes passed through both the core simulation area of the SATURN network and also the outer buffer area.

Three journey time routes were surveyed during June 2007, as documented and summarised in the Report of Transport Surveys for the Celbridge project. These routes were split by direction to give a total of six routes for input to the model calibration. The SATURN route descriptions are:

- Blue – R405 from R445/R405 roundabout to R405 at Hazelhatch Station (4.34km);
- Green – Oldtown Road from Clane Road to Willowbrook Road (1.52km); and
- Red – R403 from Ballymakealy to R403 at Loughlinstown (2.78km).

The configuration of the surveyed journey time routes is shown in Figure 7.

DMRB Journey Time Calibration Criteria
Modelled and observed journey times comprise two elements, namely 'free-flow' link travel time and queuing delay at junctions. Both elements have been monitored, but the calibration summary refers only to overall route travel time, including both free-flow and queuing time.

Calibration standards for modelled journey times are specified in DMRB Volume 12 (Section 2, Part 1, Chapter 4, Table 4.2), in a similar manner to flow calibration standards. These requirements have been applied to the Celbridge AM and PM peak models.

There are two main journey time calibration tests specified by DMRB. These are:

- Test 1 – the percentage of all journey time routes, which have a modelled time within 15% of observed, should be 85%; and
- Test 2 – the percentage of routes on which the modelled time is greater than observed, but within 1 minute of observed, should be 85%.

The main findings from the journey time calibration are:

Test 1
The proportions of all journey time routes that have a modelled time within 15% of observed are:
- AM peak - 100%; and
- PM peak - 100%.

Test 2
The proportions of all routes, where the modelled journey time exceeds the observed and which have a modelled time within 1 minute of observed are:

- AM peak - 100%; and
- PM peak - 100%.

As regards the calibration tests for different journey routes, it can be seen that each of the base models performs very well, with 100% of routes achieving the DMRB criteria in each case.

Validity of the Celbridge Saturn Model

It is concluded that the Celbridge base 2007 SATURN model is robust and sufficiently well calibrated to be used as a valid foundation for further stages in the scheme appraisal, namely forecasting.

The AM peak and PM peak models all show accurate comparison to observed conditions and the models are reliable, in terms of matrix O/D movements, assigned traffic flows, route choice and network journey times.

The Vissim Microsimulation Model

A separate VISSIM model has been created for the core area of Celbridge to further evaluate options for changing traffic flow in the vicinity of the bridge over the River Liffey. VISSIM also has the benefit of being able to show the operation of junctions graphically.

The base trip input into the VISSIM model was achieved by using fixed assignments output from the SATURN model, validated for 2007, by journey times, queue observations and delay measurements.

Results

This section outlines the results of a framework appraisal. The traffic forecasts provide an understanding of potential traffic flows and patterns throughout the network over the future years, thereby allowing particular solutions to be developed and assessed in terms of their impact in addressing specified objectives.

Traffic Forecasts

The future levels of traffic presented below take account of two main elements of growth:
the "background" growth due to the combination of general economic growth outside the study area; and
site specific development proposals considered for Kilcock itself.

It should be noted that as the modelling exercise does not include an element of modal change, no adjustment has been made to the forecasts to take account of the effects of policy and management measures (i.e. "mobility management") being introduced to encourage the use of sustainable modes of transport such as public transport, cycling and walking. The forecast traffic flows are therefore likely to show a worst case situation.

Details of the matrix building process to incorporate forecast traffic are set out thus:

Background Traffic Growth
The National Road Authority Future Traffic Forecasts 2002-2040 (August 2003) provides traffic growth estimates up to 2040. These are reproduced to 2017 below in Table 18.

	2002		2007		2017	
	PC	**HCV**	**PC**	**HCV**	**PC**	**HCV**
National Primary	100	100	123	120	156	155
National Secondary	100	100	120	117	149	147
Non-National	100	100	111	109	126	124

Source: NRA Future Traffic Forecasts 2002-2040 (August 2003)
Note: PC – Private Cars and Light Vans: HCV – Heavy Commercial Vehicle >3.5 tonnes
Table 18: NRA Future Traffic Growth Figures 2002-2017

The base year for the project is 2007 with future year model runs in 2017. By interpolating the traffic growth figures above, it is possible to estimate the relevant figures for National Primary and Non-National routes relevant to Celbridge using 2007 as the base year in Table 19.

	2007		2017	
	PC	HCV	PC	HCV
National Primary (Rebased)	1.00	1.00	1.27	1.29
Non-National (Rebased)	1.00	1.00	1.14	1.14

Source: TPi
Note: PC – Private Cars and Light Vans: HCV – Heavy Commercial Vehicle >3.5 tonnes
Table 19: Traffic Growth for Study Area: 2005 base year

Application of the growth factors to origin and destination zones in the model matrices has been determined using a 'Furness' procedure. The procedure applies the growth factors iteratively to the traffic within the traffic zones until it is balanced.

Site Specific Developments

Development trip predictions were produced for four key land use sites identified with the traffic model area. These locations detailed in Section 0 and shown on Figure 19 are:

D1 - Simmonstown (Planning Ref: 06/1049)
D2 - Oldtown Mill (Planning Ref: 06/1265)
D3 - Oldtown Mill (Planning Ref: 07/1706)
D4 - Tesco Redevelopment (Planning Ref: 05/2713)
D5 - Maynooth Road (Planning Ref: 06/1044)
D6 - Hazelhatch Park (Planning Ref: 05/960)
D7 - Willow Avenue (Planning Ref: 05/1727)
D8 - Loughlinstown (Planning Ref: 03/1176)
D9 - Mixed Use Development at Donaghcumper

The derivation of predicted trips was done by extracting records of traffic movements from the individual developments Transport Assessment, which were provided by Kildare County Council.

A separate development-only trip matrix was created for each of the nine sites and for each time period, assessment year and growth scenario.

Distribution of development trips amongst origin and destination zones in the model have been calculated using a 'Furness' procedure. This technique predicts how new trips from origin zones were likely to be distributed amongst distribution zones. The process was structured to match the pattern and distribution of origin destination movements contained in the validated matrices in the 2007 base model.

Overall, full growth, all-vehicle, trip matrices for 2017 and time period were produced, by combining the development trip matrices with the NRA factored vehicle trip matrices. A summary of the peak hour pcu trip totals is shown in Table 20.

Year	Peak Period	
	AM	PM
2007	4286	4766
2017	6086	7165

Source: TPi
Table 20: Trip Matrix Totals (PCUs): Base and Development Traffic, Celbridge