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Project Appraisal Guidelines Unit 5.3 - Travel Demand Projections

PE-PAG-02017
November 2026

PE Planning & Evaluation

Technical

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Contents

1. **Introduction** 1
2. **The Role of National Travel Demand Projections** 2
3. **Demographic and Economic Growth Projections** 3
4. **Demographic and Economic Growth Projections - Special Zones** 4
5. **Application of Traffic Growth Projections** 5
6. **Link-Based Growth Rates** 7
7. **Zone-Based Growth Rates** 14
8. **Application to Economic Appraisal** 18
9. **Uncertainty in Travel Demand Projections** 19

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Updated to include a new alternative demand scenario to assist in assessing potential impacts of longer term increases in home working, arising from the COVID-19 pandemic.

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Amendment Details:

Updated to include revised demand forecasts for 2040 and 2056, including new zonal growth provided in appendices.

Updated text to refer to TII Projects instead of National Roads for consistency with other PAG Units and reduce bias.

Updated Chapter 9 - Uncertainty in Travel Demand Projections.

Added alternate text for all charts, maps and graphics.

Removed Chapter on Alternative Future Demand Scenario.

Contents Table

1. Introduction 1

2. The Role of National Travel Demand Projections 2

3. Demographic and Economic Growth Projections 3

4. Demographic and Economic Growth Projections - Special Zones 4

5. Application of Traffic Growth Projections 5

6. Link-Based Growth Rates 7

7. Zone-Based Growth Rates 14

8. Application to Economic Appraisal 18

9. Uncertainty in Travel Demand Projections 19

1. Introduction

1.1 Overview

PAG Unit 5.1: Construction of Transport Modelling provides guidance on the development of transport models for use in the appraisal of transport infrastructure. The guidance addresses the scoping and construction of transport models which reflect transport demand and supply in a 'Base Year'.

This Unit of the Project Appraisal Guidelines (PAG) provides guidance on the preparation of future travel demand projections for use in modelling and appraisal.

The guidance set out in this Unit is applicable for the modelling and appraisal of TII Projects, although the guidance is equally applicable to traffic on regional and local road schemes.

In certain circumstances, localised factors may dictate the use of alternative growth projections. The methodology for projecting future year demand needs to be set out in the Appraisal Plan section of the Project/Programme Outline Document (POD) and agreed with the TII Strategic and Transport Planning Section prior to the commencement of the modelling/appraisal of a TII Project.

1.2 Implementation

This Technical Document provides updated traffic growth forecasts, arising from the latest Central Statistics Office (CSO) Census information coupled with National Planning Framework (NPF) forecasted demographic growth, at the date of publication. These updated traffic growth forecasts should be used for all applicable National Road projects initiated or moving from one Phase in the Project Management Guidelines to the next after the date of publication of this document. For all other National Road projects, the updated growth forecasts may be used at the sole discretion of the Project Manager and where the Project Manager is satisfied that unacceptable additional costs will not accrue to the project arising from the need to amend previously completed traffic modelling, assessments and appraisals.

2. The Role of National Travel Demand Projections

Unbiased future travel demand projections are a critical input in ensuring that the capacity for transport infrastructure is neither too large nor too small to meet future travel demand. Furthermore, travel demand projections inform the economic and environmental appraisal of transport schemes and therefore play a fundamental role in deciding whether a scheme should progress and in the prioritisation of schemes.

Consistency in the appraisal of TII Projects is achieved by the use of common predictions of growth in transport demand which are based on national and local projections of demographic and economic factors. These demographic and economic factors are used to project the future demand for travel across all zones in the TII National Transport Model (NTpM). The procedures discussed in this PAG Unit outline the application of such growth projections to scheme modelling and appraisal.

Travel demand projections should not be viewed as what will happen in the future or what we want the future to look like, but instead what may happen based on our current understanding of how people make travel choices and the expected key drivers of travel demand. The benefits of major roads projects are generally appraised over an extended period of time (up to 60 years); therefore, scheme promoters and decision makers need to understand that projecting travel demand over an extended period is uncertain. See Section 9 of this Unit for further discussion on uncertainty relating to travel demand projections.

The adoption of this approach means that travel demand projections are realistic in the light of current trends and travel behaviour. Nevertheless, they should be regarded as constituting a set of Baseline Projections that may warrant revision in line with the implementation of future spatial strategies.

3. Demographic and Economic Growth Projections

Future travel demand projections were developed as part of the NTpM, based on demographic projections and economic assumptions. The NTpM includes travel demand projections for two future years, 2040 and 2056, across both private and public transport modes. The projections have been developed around those produced for the Project Ireland 2040: National Planning Framework (2025)[1] by the Department of Housing, Planning and Local Government.

For the purpose of this publication, TII has developed three future growth scenarios for use in the NTpM. A central growth scenario and two sensitivity growth scenarios (Low and High) which are based on adjusted demographic and economic projections.

In order to estimate the level of demand across these modes, various demographic and economic projections were required. An overview of the demographic and economic models used to inform the future travel demand projections for the NTpM is provided below:

- **Population and Jobs Models**: The projections of future growth in population and jobs were provided at Electoral Division (ED) level, which corresponds to NTpM zone level. The central projection is based on the National Planning Framework. The low and high growth sensitivity scenarios are based on the CSO Population and Labour Force Projections 2023-2057 “M3” and “M1” scenarios respectively, which assume different levels of migration, mortality, and fertility rates;
- **Car Ownership Model:** A bespoke national car ownership model was developed using statistical choice models based on current survey data and Census data and was applied at household level, indicating whether a household owns a car or not. Projected household density, household adults, and driving licence holding trends were considered in respect of the population projections, whilst household income was forecast using economic assumptions and bus accessibility measures forecast using expected schemes. These factors were all used to project household car ownership at NTpM zone level;
- **Goods Vehicles:** Light Goods Vehicles (LGV) and Heavy Goods Vehicles (HGV) forecasts were derived based on jobs projections at NTpM zone level. An annual increase of 1% above employment growth was applied to LGV demand to reflect the continuing expected increase in LGV demand (over and above the effects of employment growth);
- **Travel Demand**: In order to convert future socio-economic projections (population, jobs, car ownership, etc.) into car vehicle trips and public transport passenger trips, an iterative demand model structure is implemented. This uses the projections of population and employment, trip rates, and changes in travel costs as a result of future schemes to generate a future demand response. This is a people-based, absolute approach, accounting for spatial variation in demographic patterns and land use, as opposed to a more simplified trend-based approach; this enables structural step-changes in transport and behaviour rather than incremental extrapolation from the base year.

A detailed discussion on the background data and methodologies used to inform the estimates of future travel demand in the NTpM is presented in the National Transport Model’s suite of supporting documentation available to download from TII’s library of publications: tii.ie/tii-library/strategic-planning/

[1] https://www.npf.ie/first-revision-to-the-national-planning-framework/national-planning-framework-first-revision-april-2025/

4. Demographic and Economic Growth Projections - Special Zones

The zone structure in the TII National Transport Model includes zones solely representing ports and airports, in line with the National Ports Policy[2] and National Aviation Policy[3]. Tier 1, Tier 2, and regionally significant ports and airports have been included in the NTpM zoning structure.

Special forecasting processes were applied to all ports and airports zones in the NTpM. Details of these processes and of the updated zone structure of the NTpM is provided in the suite of NTpM supporting documentation which is available to download from tii.ie/tii-library/strategic-planning/.

[2] *National Ports Policy (2013) – Department of Transport, Tourism and Sport*
[3] *A National Aviation Policy for Ireland (August 2015) – Department of Transport, Tourism and Sport*

5. Application of Traffic Growth Projections

As outlined in PAG Unit 5.0: Scoping of Transport Modelling, it is neither practicable nor efficient to develop highly complex models for low levels of investment where limited changes to travel patterns would be expected. Likewise, it is important that larger investments, which will lead to significant changes in travel patterns, are based on a detailed understanding of user responses to inform the economic, safety and environmental impacts of the scheme. The Project Appraisal Guidelines describe three levels of transport model functionality as follows:

- **Simple Models** - which reflect traffic volumes on the basis of link flows. Such models do not attempt any route assignment, and hence are only applicable for small networks where no change in traffic flows will result from a proposed scheme;
- **Assignment Models** - which allocate demand matrices through traffic networks, thereby replicating route choice by vehicles for each origin-destination pair; and
- **Variable Demand Models** - which replicate demand responses where they might be expected to occur as a result of a scheme, for example in larger towns and cities with congested road networks. The demand responses considered here comprise changes in trip rates, choice of destination and travel mode.

The application of traffic growth will differ for each of these model types. Future projections can be undertaken by applying growth factors to link flows (Link-Based Growth Projections) or by applying trip end growth to demand matrices (Zone-Based Growth Projections). Table 5.1 sets out the traffic growth projection methodology to be used in the three transport model categories defined.

Table 5.1 Criteria for Projecting Traffic Growth

Category	Simple Models	Assignment Models	Variable Demand Models
Description	Manual assignment calculations using fixed demand flows. Can comprise spreadsheet modelling, junction modelling or static microsimulation modelling	Models which use a fixed traffic demand matrix and assess impacts of reassignment only	Models which include consideration of demand responses (Trip Generation, Distribution and Mode Share)
Nature of Scheme	• Road safety schemes • Localised improvement • Schemes under €30m	• New roads • Significant upgrades to existing roads • Rural areas • Small urban areas	• New roads • Significant upgrades to existing roads • Major urban areas including special zones
Transport Response Characteristics	• Rural road networks with no route-switching • Single or multiple junctions in urban areas with no route-switching	• Schemes which will lead to changes in routing • Areas with limited public transport • Areas where induction or suppression of traffic is not anticipated • May use microsimulation models to model complex merging/shockwaves	• Schemes which will generate traffic impact • Major urban areas where congestion will exist • Schemes which lead to large reductions in journey time • Areas where induction or suppression of traffic is anticipated • Schemes which will increase competition with public transport
Applicable Methodology	Link-Based Growth Rates	Zone-Based Growth Rates	

6. Link-Based Growth Rates

For simple models, traffic flows are generally represented as vehicular traffic flows on links, with limited information on origin, destination or trip length. In such cases, future year traffic growth is projected using growth rates which describe likely traffic growth that may occur over the appraisal period of the scheme.

The derivation of link-based growth rates is based on an aggregate projection of growth in vehicle kilometres within a defined geographical area, with appropriate classifications by vehicle type and projected period. This allows the specification of a series of growth rates which can be applied directly to traffic flows on simple networks to generate an appropriate estimate of future traffic flows.

The NTpM was used to generate aggregate growth in vehicle kilometres over the projected periods from 2023 to 2040 and from 2040 to 2056. In preparing growth projections, it was determined that there was limited correlation between road type and anticipated growth rates. Geographical location was instead determined to be the most significant factor influencing growth in vehicle kilometres.

The geographical regions selected were the Counties of the Republic of Ireland and the National Planning Framework Metropolitan Areas[4], which are illustrated in Figures 6.1 - 6.5. A boundary shapefile of the Metropolitan Areas is provided as an attachment to PAG Unit 5.3 which is available from the "Supplementary Documents" section of the TII Publications website under section PE-PAG-02017_Unit-5.3.

Traffic growth is also strongly determined by vehicle type, with growth in Car, LGV, and HGV traffic being driven by different factors. Growth rates are therefore calculated separately for the different vehicle types.

Link-based growth rates for each of the Metropolitan Areas and Counties of the Republic of Ireland are provided in Table 6.1 and Table 6.2 respectively, across the three projected periods and for Car, LGV, and HGV. The link-based growth rates for each county excluded the Metropolitan Area growth.

The central growth rates are intended for use in project appraisal with the low and high growth rates to be used as sensitivity tests for economic and environmental impacts.

[4] As defined in Appendix 4 of the 'Implementation Roadmap for the National Planning Framework', Department of Housing, Planning and Local Government (July 2018).

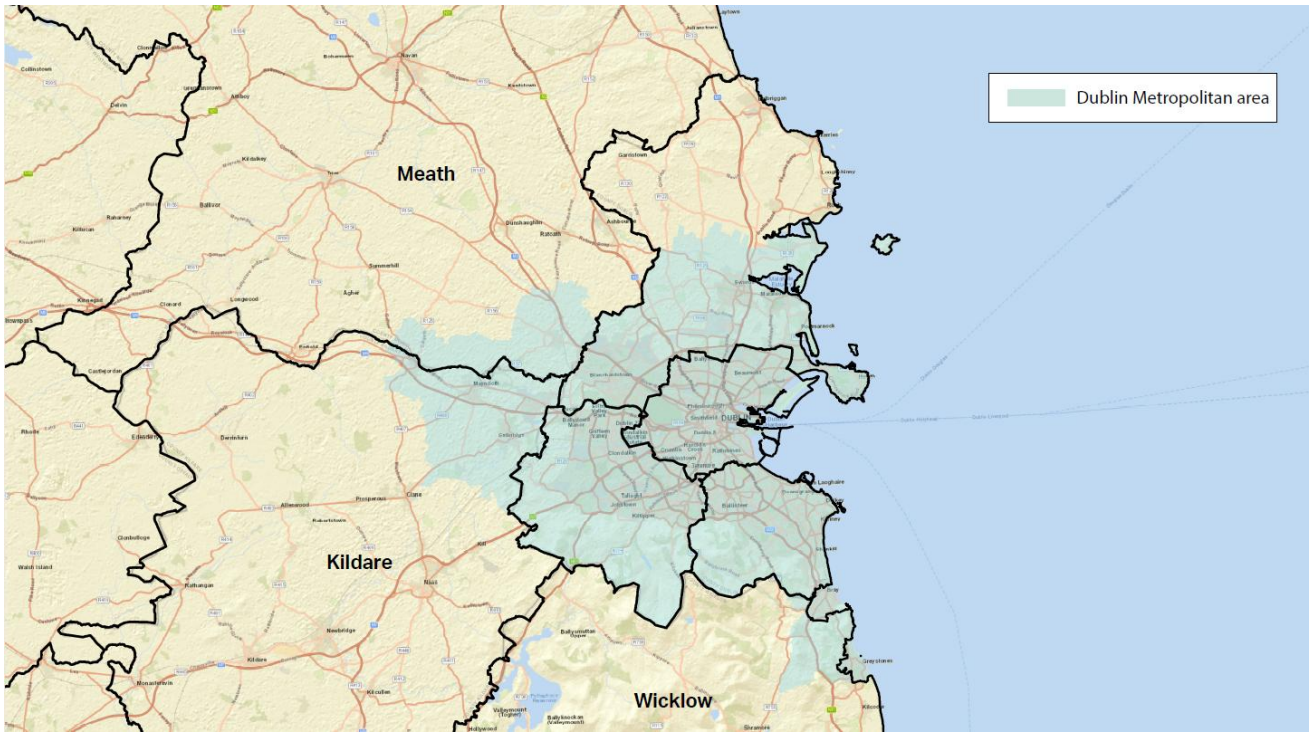


Figure 6.1 Dublin Metropolitan Area

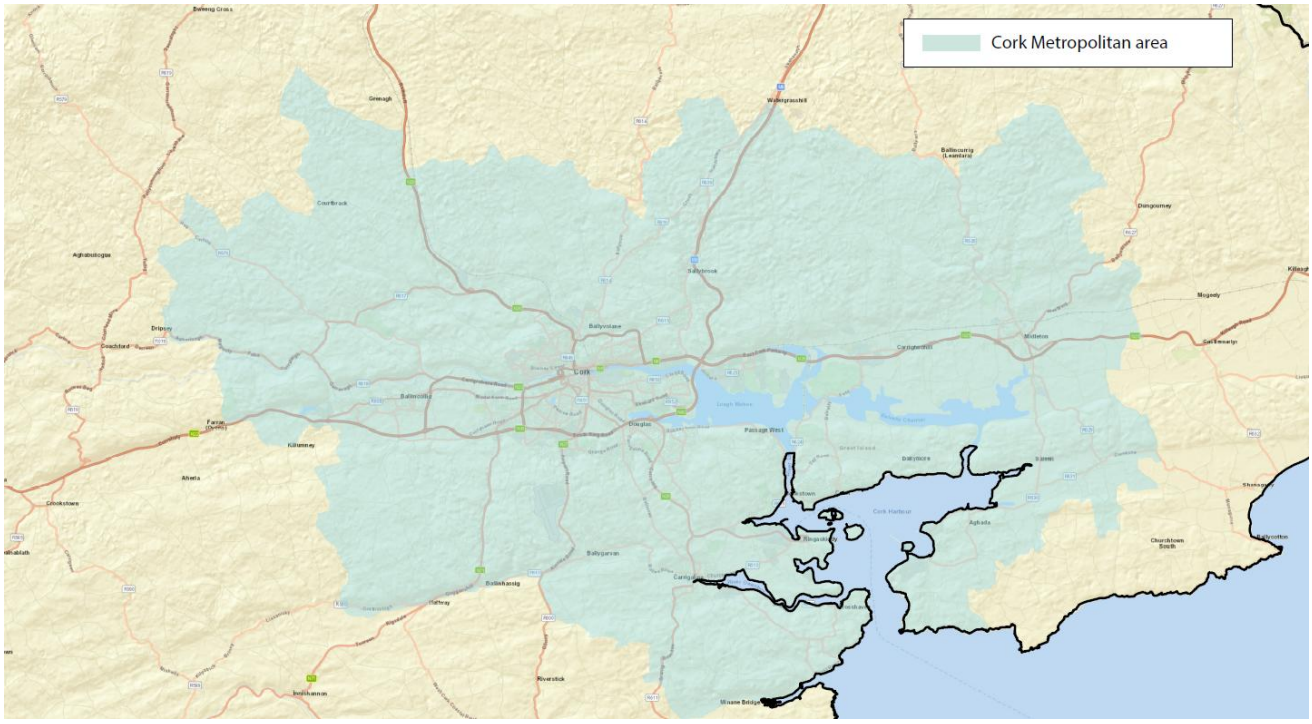


Figure 6.2 Cork Metropolitan Area

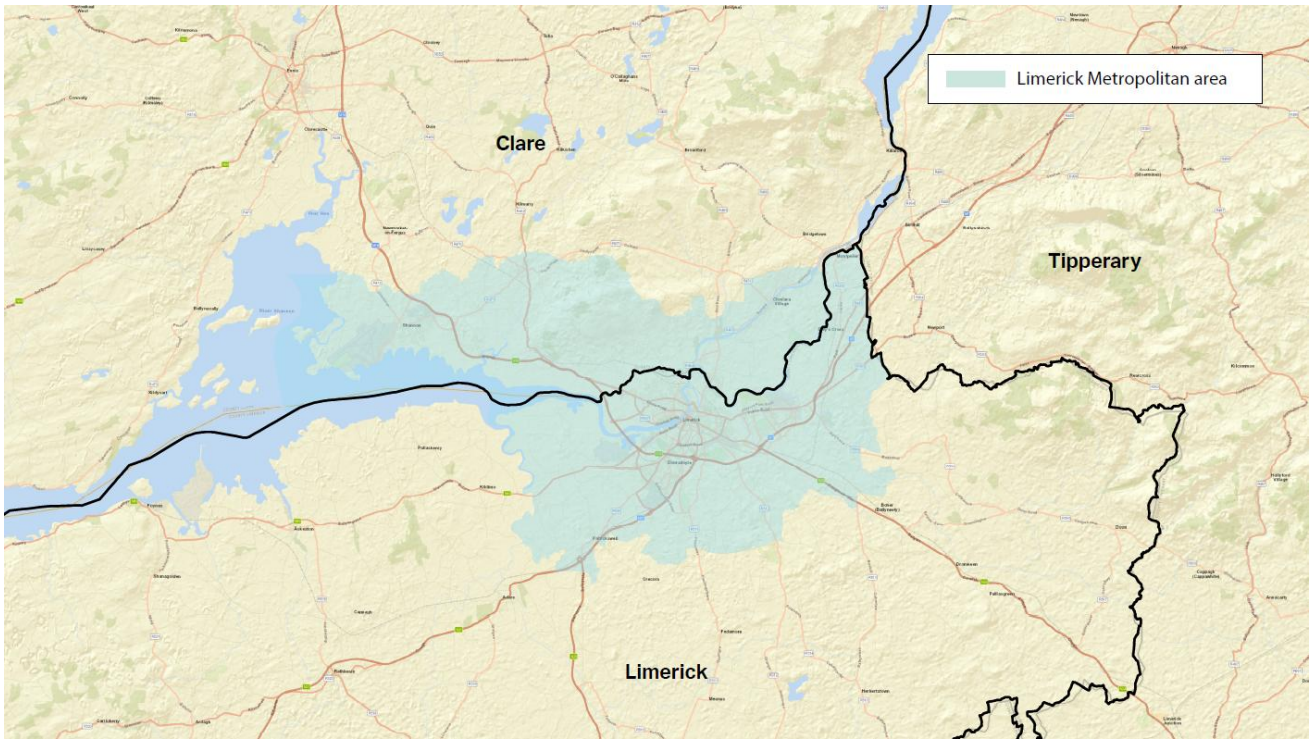


Figure 6.3 Limerick Metropolitan Area

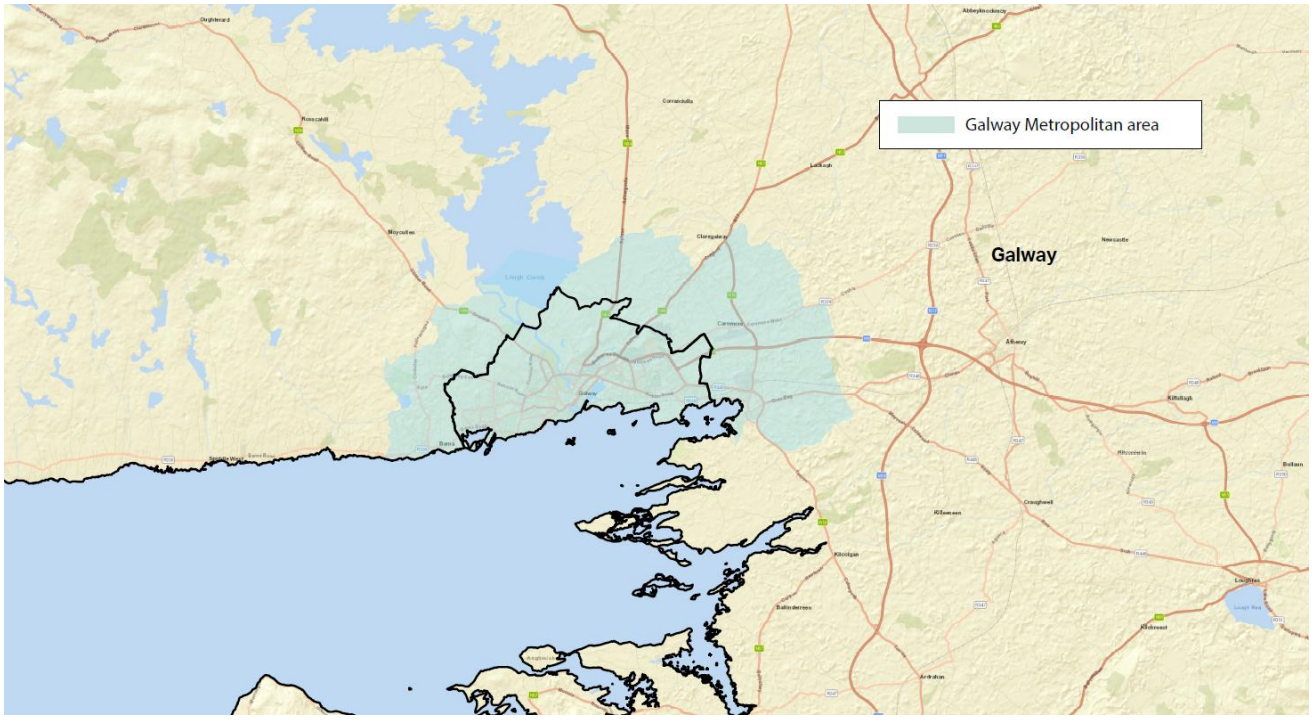


Figure 6.4 Galway Metropolitan Area

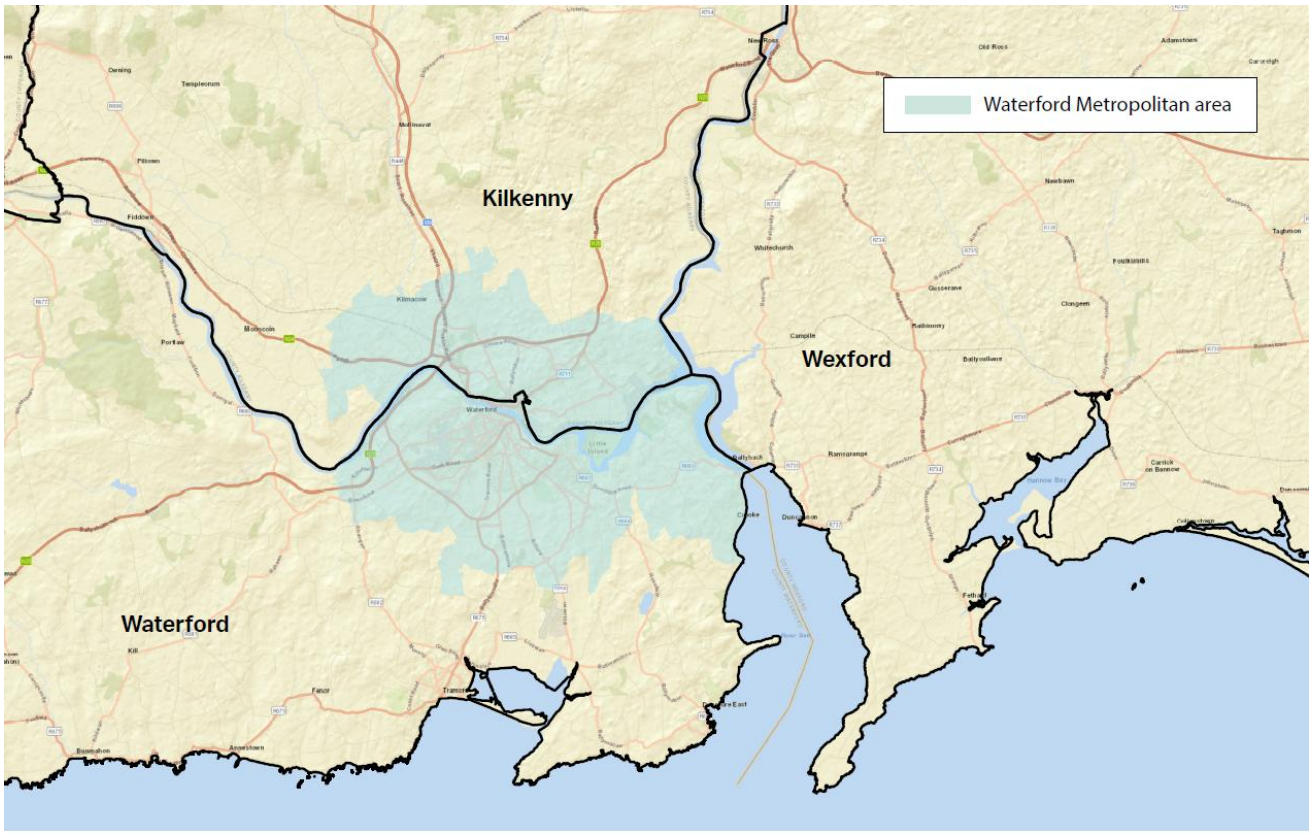


Figure 6.5 Waterford Metropolitan Area

Table 6.1 Link-Based Growth Rates: Metropolitan Area Annual Growth Rates

Metropolitan Area	Low Sensitivity Growth Rates						Central Growth Rates						High Sensitivity Growth Rates					
	2023-2040			2040-2056			2023-2040			2040-2056			2023-2040			2040-2056		
	Car	LGV	HGV	Car	LGV	HGV	Car	LGV	HGV	Car	LGV	HGV	Car	LGV	HGV	Car	LGV	HGV
Dublin	1.0149	1.0233	1.0110	1.0040	1.0124	1.0069	1.0169	1.0262	1.0133	1.0066	1.0147	1.0081	1.0185	1.0286	1.0152	1.0082	1.0163	1.0092
Cork	1.0137	1.0251	1.0096	1.0052	1.0129	1.0024	1.0164	1.0281	1.0123	1.0087	1.0152	1.0046	1.0185	1.0305	1.0146	1.0110	1.0169	1.0059
Galway	1.0143	1.0220	1.0075	1.0061	1.0119	1.0019	1.0170	1.0249	1.0099	1.0099	1.0141	1.0038	1.0193	1.0273	1.0120	1.0123	1.0158	1.0052
Limerick	1.0144	1.0234	1.0079	1.0050	1.0126	1.0018	1.0171	1.0264	1.0107	1.0087	1.0149	1.0040	1.0193	1.0288	1.0131	1.0110	1.0165	1.0054
Waterford	1.0147	1.0280	1.0088	1.0076	1.0146	1.0052	1.0174	1.0311	1.0111	1.0116	1.0170	1.0066	1.0199	1.0335	1.0129	1.0140	1.0187	1.0078

Table 6.2 Link-Based Growth Rates: County Annual Growth Rates (excluding Metropolitan Area)

County	Low Sensitivity Growth Rates						Central Growth Rates						High Sensitivity Growth Rates					
	2023-2040			2040-2056			2023-2040			2040-2056			2023-2040			2040-2056		
	Car	LGV	HGV	Car	LGV	HGV	Car	LGV	HGV	Car	LGV	HGV	Car	LGV	HGV	Car	LGV	HGV
Dublin	1.0201	1.0232	1.0148	1.0060	1.0121	1.0086	1.0224	1.0260	1.0165	1.0094	1.0141	1.0097	1.0243	1.0283	1.0177	1.0113	1.0156	1.0106
Kildare	1.0202	1.0210	1.0081	1.0078	1.0122	1.0022	1.0225	1.0239	1.0108	1.0107	1.0144	1.0045	1.0244	1.0263	1.0131	1.0125	1.0161	1.0061
Laois	1.0241	1.0192	1.0093	1.0115	1.0122	1.0024	1.0266	1.0222	1.0125	1.0145	1.0144	1.0044	1.0286	1.0246	1.0152	1.0164	1.0161	1.0057
Longford	1.0142	1.0158	1.0044	1.0037	1.0109	1.0005	1.0170	1.0188	1.0073	1.0072	1.0131	1.0027	1.0194	1.0212	1.0096	1.0093	1.0148	1.0042
Louth	1.0177	1.0221	1.0111	1.0038	1.0119	1.0074	1.0200	1.0247	1.0122	1.0074	1.0140	1.0078	1.0221	1.0270	1.0131	1.0094	1.0156	1.0085
Meath	1.0216	1.0224	1.0096	1.0080	1.0127	1.0040	1.0244	1.0255	1.0122	1.0120	1.0151	1.0060	1.0268	1.0280	1.0144	1.0145	1.0168	1.0073
Offaly	1.0172	1.0193	1.0051	1.0073	1.0120	1.0010	1.0200	1.0223	1.0082	1.0112	1.0142	1.0034	1.0223	1.0248	1.0106	1.0137	1.0159	1.0053
Westmeath	1.0202	1.0173	1.0077	1.0079	1.0115	1.0023	1.0227	1.0203	1.0105	1.0114	1.0138	1.0045	1.0250	1.0228	1.0128	1.0134	1.0155	1.0062
Wicklow	1.0178	1.0222	1.0106	1.0072	1.0124	1.0035	1.0206	1.0254	1.0137	1.0111	1.0151	1.0052	1.0230	1.0279	1.0162	1.0135	1.0170	1.0067
Cavan	1.0131	1.0171	1.0069	1.0033	1.0120	1.0008	1.0159	1.0201	1.0098	1.0078	1.0142	1.0033	1.0183	1.0224	1.0123	1.0105	1.0159	1.0049
Donegal	1.0119	1.0175	1.0079	1.0036	1.0111	1.0009	1.0142	1.0203	1.0109	1.0071	1.0133	1.0029	1.0163	1.0225	1.0132	1.0092	1.0148	1.0044
Galway	1.0221	1.0199	1.0082	1.0083	1.0125	1.0023	1.0251	1.0229	1.0112	1.0128	1.0149	1.0047	1.0277	1.0254	1.0137	1.0155	1.0165	1.0065
Leitrim	1.0166	1.0134	1.0060	1.0071	1.0108	1.0006	1.0195	1.0164	1.0091	1.0116	1.0132	1.0027	1.0221	1.0188	1.0113	1.0143	1.0150	1.0045
Mayo	1.0110	1.0180	1.0082	1.0021	1.0113	1.0014	1.0139	1.0209	1.0111	1.0069	1.0136	1.0035	1.0164	1.0233	1.0136	1.0098	1.0153	1.0051
Monaghan	1.0125	1.0185	1.0080	1.0021	1.0122	1.0039	1.0153	1.0214	1.0105	1.0064	1.0144	1.0055	1.0177	1.0237	1.0126	1.0090	1.0161	1.0069
Roscommon	1.0163	1.0164	1.0081	1.0050	1.0113	1.0023	1.0192	1.0194	1.0109	1.0093	1.0136	1.0044	1.0216	1.0219	1.0133	1.0119	1.0153	1.0059
Sligo	1.0161	1.0168	1.0079	1.0066	1.0116	1.0012	1.0189	1.0197	1.0108	1.0110	1.0139	1.0033	1.0213	1.0221	1.0131	1.0135	1.0156	1.0049
Carlow	1.0160	1.0176	1.0048	1.0069	1.0119	0.9993	1.0187	1.0205	1.0075	1.0109	1.0142	1.0029	1.0211	1.0229	1.0096	1.0132	1.0159	1.0051
Clare	1.0143	1.0175	1.0063	1.0055	1.0118	1.0001	1.0174	1.0205	1.0093	1.0103	1.0141	1.0024	1.0198	1.0229	1.0117	1.0133	1.0159	1.0044
Cork	1.0184	1.0191	1.0061	1.0063	1.0124	1.0014	1.0211	1.0221	1.0091	1.0105	1.0147	1.0037	1.0235	1.0245	1.0116	1.0129	1.0164	1.0055
Kerry	1.0103	1.0158	1.0050	1.0017	1.0113	1.0007	1.0129	1.0188	1.0079	1.0063	1.0136	1.0028	1.0154	1.0212	1.0102	1.0089	1.0152	1.0044
Kilkenny	1.0189	1.0187	1.0074	1.0081	1.0125	1.0027	1.0217	1.0217	1.0101	1.0121	1.0148	1.0052	1.0241	1.0241	1.0124	1.0145	1.0165	1.0070
Limerick	1.0168	1.0195	1.0075	1.0039	1.0125	1.0016	1.0197	1.0226	1.0105	1.0084	1.0147	1.0039	1.0223	1.0250	1.0129	1.0111	1.0165	1.0056
Tipperary	1.0181	1.0176	1.0066	1.0075	1.0120	1.0006	1.0208	1.0205	1.0096	1.0117	1.0143	1.0029	1.0233	1.0229	1.0120	1.0141	1.0160	1.0044
Waterford	1.0198	1.0200	1.0066	1.0080	1.0129	1.0038	1.0227	1.0231	1.0094	1.0122	1.0152	1.0056	1.0252	1.0255	1.0115	1.0147	1.0170	1.0074
Wexford	1.0164	1.0201	1.0116	1.0079	1.0125	1.0070	1.0190	1.0230	1.0140	1.0120	1.0148	1.0084	1.0214	1.0255	1.0159	1.0142	1.0165	1.0095

6.2 Applicability

The link-based growth rates set out in this section of the Unit should be used in Simple Models only. They should not be used to derive traffic growth in Assignment Models or Variable Demand Models, which require a separate method for future traffic growth projections, described in Section 7.

The application of link-based growth rates in simple models is given in Figure 6.6.

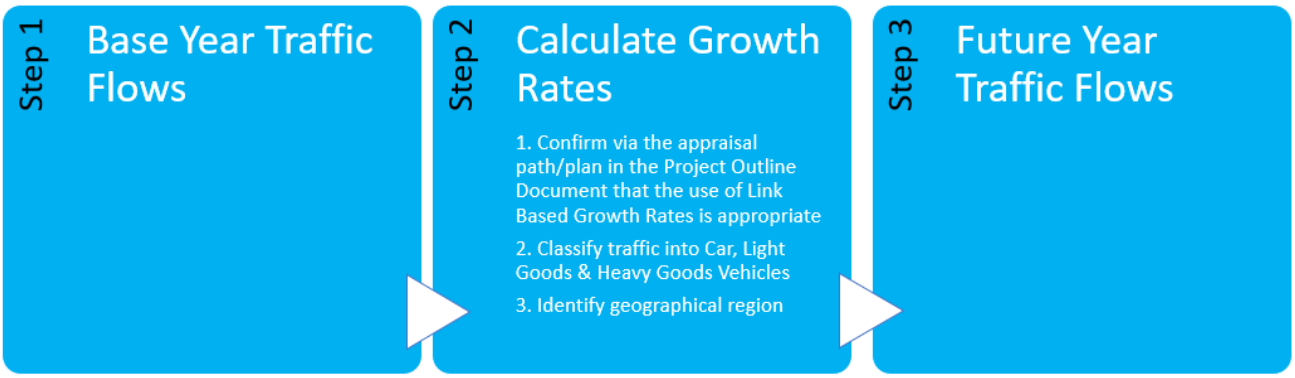


Figure 6.6 Application of National Traffic Growth Projections

For larger networks which straddle the defined geographical regions, it is acknowledged that the application of varying growth rates to different elements of the network may lead to an imbalance in flows on the network. A process to address this issue should be set out in the Appraisal Plan section of the POD and agreed with TII prior to the commencement of any modelling or scheme appraisal.

Traffic growth rates are only provided up to 2056; for the purposes of scheme appraisal, no traffic growth beyond 2056 should be assumed unless specifically agreed with TII. Exceptions to this approach may include longer term schemes for which a significant proportion of the 30 year appraisal period is post 2056.

7. Zone-Based Growth Rates

For larger schemes which are supported by assignment models, demand is input in the form of a matrix which allocates demand based on defined trips between geographical zones. In such cases, growth rates should be applied as increases in trip ends at a zonal level. The factoring of origins and destinations at a zonal level, leads to the definition of target trip ends. This is then translated into a future year matrix through furnessing, which adjusts the demand matrix such that row and column totals match the target trip ends.

7.1 Internal Zones

Application of zone-based growth rates requires a different approach for internal and external zones within the Local Area Model (LAM). For internal zones, trip end growth rates for the AM, Interpeak, and PM periods are read from a shapefile that is available from the Supplementary Documents page on the TII Publications website. These growth rates are applied to the row and column totals of the base year trip matrix to produce target trip ends for the future year matrix.

The shapefile provides demographic and economic information for each zone in the NTpM, in addition to annual growth rates for origin and destination trip ends. The data are given with reference to both NTpM model zoning and incremental zoning, with a one-to-one correspondence between them. The shapefile uses a standard naming convention to identify all variables in the data. A description of this data is provided below in Table 7.1 while demographic and growth factors examples are provided in Table 7.2.

Table 7.1 Schedule of Data Contained in NTpM23 Shapefile

Category	Parameter	Description
Demographic	Pop/Emp/HH/CO/Jobs	Population/Employment/Households/Car Owning Households/Jobs
	23/40/56	Applicable Year (2023/2040/2056)
	L/C/H	Scenario (Low/Central/High)
Growth Factors	AM/IP/PM	Period of Assessment
	C/L/H	Vehicle Class (Car/LGV/HGV)
	1/2	Period of Growth – (1 denotes 2023 to 2040 and 2 denotes 2040 to 2056)
	O/D	Origin/Destination Trip End Factor
	L/C/H	Scenario (Low/Central/High)

Table 7.2 Demographic and Growth Factors Examples

Examples		
Demographic	Emp_40C	Employment projection in 2040 for Central Growth Scenario
Demographic	CO_23	Car Owning Households in 2023
Growth Factor	PMC_1_OL	PM Peak period growth factor for Car Vehicles during period 2023-2040. Applies to Origin Trip Ends for Low Growth Scenario.
Growth Factor	AMH_2_DC	AM Peak period growth factor for HGV during period 2040-2056. Applies to Destination Trip Ends for Central Growth Scenario.

Note that “Employment” refers to the population resident in the given zone that are in employment whilst “Jobs” refers to the jobs that are available in the given zone.

The “HH” term gives the total number of households in the given zone, and the “CO” term is the number of households owning a car.

The zone-based growth rates are contained within the downloadable file PE-PAG-02017_Unit-5.3-Attachments.zip which is available from the “Supplementary Documents” section of the TII Publications website. The file containing the growth rates is referred to as NTpM23_Zone_Based_Growth_Rates.xlsx.

For LAM’s where internal zones are smaller than NTpM zones, the growth rates for the NTpM should initially be applied to all LAM zones within that NTpM zone. It is for this reason that it is advisable to ensure that LAM zones are defined as subzones of NTpM zones to avoid any overlapping of LAM zones between adjacent NTpM zones.

Within the LAM, there is some flexibility to reallocate growth between different LAM zones within a single NTpM zone, although the trip end growth for the collective LAM zones that form the NTpM zone should remain consistent with the zone-based trip end growth rates. For example, it may be possible to use County Development Plans/Local Area Plans to allocate/distribute the growth based on the locations of future zoned land for residential, industrial/office park developments, etc. These approaches should be well documented and are valid as long as the distributed growth within the LAM zones is constrained by the overall growth in the NTpM zone.

The projections provided in this PAG Unit are in the form of annual average trip end growth rates. This facilitates flexibility in their application for various scheme opening, design and forecast years. It must be remembered that these are derived from long term projections over a 17–33 year period. Therefore, they are not appropriate for use for short term projections, e.g. 1-5 years, nor should they be directly compared to observed growth rates in the short term. In reality, changes in traffic volumes over a short term period may be substantially higher or lower than these growth rates. However, allowing for economic cycles over the long term, where traffic volumes can rapidly grow but also decline year on year, the figures are a reasonable representation of the projected average annual growth over the appropriate period in question, i.e. 2023 to 2040 and 2040 to 2056.

7.2 External Zones

A cordon reflecting the boundary of the LAM is extracted from the Base Year (2023) and Future Year (2040) NTpM. The resulting growth factor is annualised, and then applied to the external zones in the LAM over the appropriate period. The same procedure is applied to the 2056 NTpM, comparing it to the 2040 cordon, to establish growth in external zones beyond 2040.

7.3 Special Zones

The application of growth to special zones should be detailed in the Appraisal Plan section of the POD and agreed with the TII Strategic and Transport Planning Section prior to the commencement of modelling/appraisal of a TII Project. These are indicated by “SZ”.

7.4 Future Year Demand Matrices

Once new trip end totals for each LAM zone (internal and external) have been developed, the future year trip matrix can then be derived via the furness trip distribution method, which manipulates matrix cells to match defined row and column totals. In undertaking this process, seeding of zero cells may be required using either a gravity modelling technique or through the application of distribution from an adjacent zone with similar travel patterns.

During the trip distribution process, the matrix totals must be constrained to the NTpM trip ends. Even where it is appropriate to include the impact of known developments in particular zones and where a gravity model or the adjacent zone technique is used. The total number of trips within the local matrices must be constrained to the NTpM totals for the same area.

Any assumptions about the nature and location of specific developments should be clearly explained in the Transport Modelling Report and a rationale provided for their inclusion. The resulting impact on growth factors for the remaining zones within the model should also be reported and any unexpected results explained.

The process for developing future traffic growth projections is presented in Figure 7.1. The National Traffic Model is the traffic module of the NTpM and is used to provide the relevant outputs for the LAM.

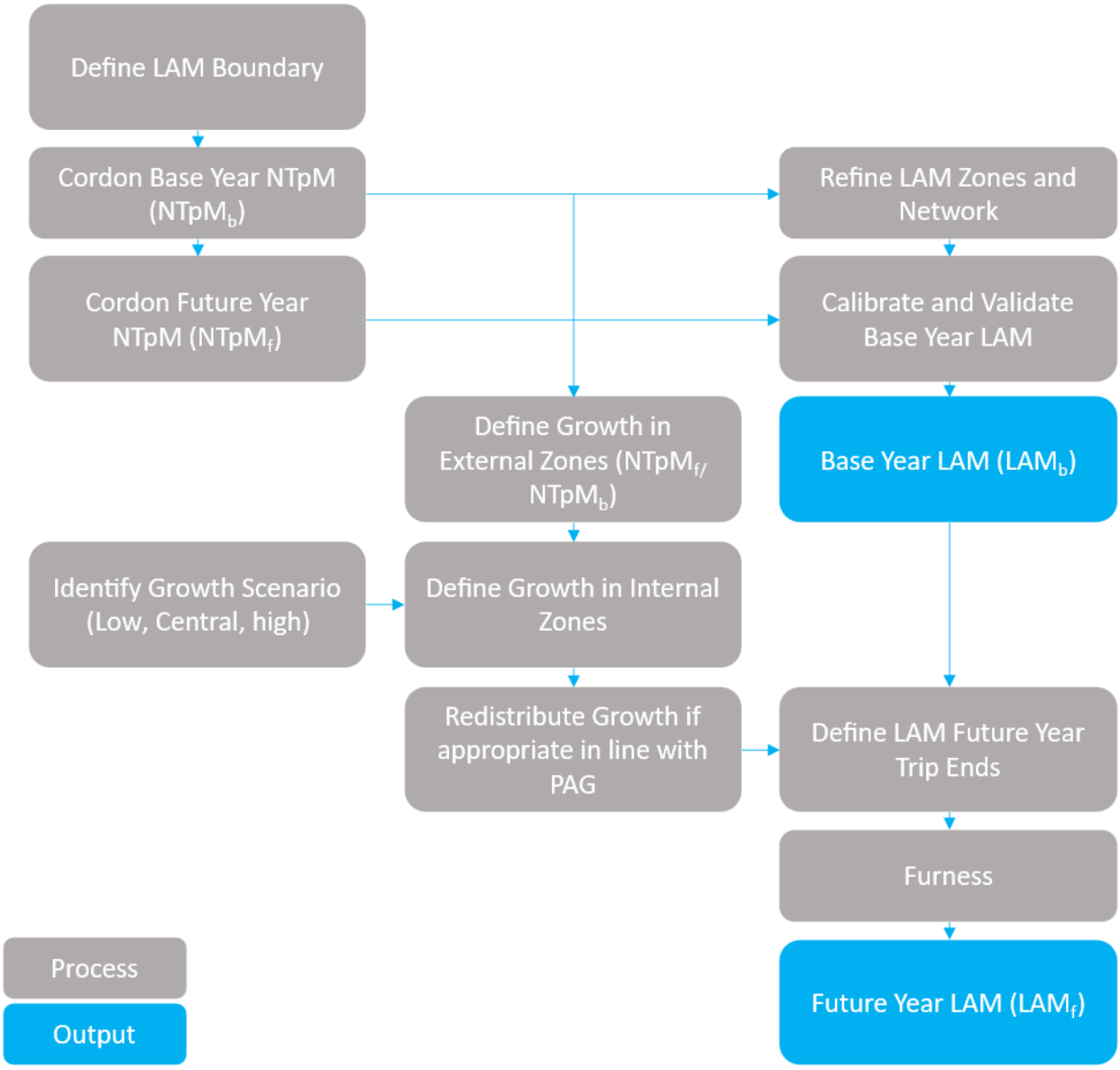


Figure 7.1 Traffic Growth Projection Methodology for Assignment Models

An analysis of the impact of the furness method on trip length distribution should be undertaken and reported in the Transport Modelling Report.

The report should also demonstrate the difference in net growth that occurs as a result of the furnessing procedure, both at zonal level and through the full LAM matrix.

Variable Demand Models (VDMs) will use zone-based growth rates to produce the initial demand projections for the Do-Minimum and Do-Something scenarios in the future year model. VDM techniques can then be used to adjust the demand matrices to reflect the demand responses associated with the scheme proposal.

The application of growth to other travel modes requires projections for public transport growth to develop a future year Production Attraction (PA) matrix. Further guidance on the preparation of growth projections for use in public transport models, including the use of Variable Demand Model, is provided in PAG Unit 5.1: Construction of Transport Models.

8. Application to Economic Appraisal

One of the main uses of traffic growth projections in Local Area Models is for the calculation of costs and benefits over the lifetime of the proposal and the calculation of the design parameters for the proposal. Cost and benefit calculations are used to derive the value for money a proposal may have when compared with other ways in which investment funding could be utilised. PAG Unit 6.1 (Guidance on Conducting CBA) provides guidance on the need for and use of cost-benefit analysis for road schemes.

The current methodology for assessing the costs and benefits set out in this Unit requires the use of TUBA (Transport Users Benefit Appraisal) to calculate the Net Present Value (NPV) and Benefit to Cost Ratio (BCR) of the proposed scheme. TUBA is supplemented by COBALT (Cost and Benefit to Accidents – Light Touch), which provides estimates of safety benefits and the Road Emissions Model (REM), which is used to assess changes in vehicle emissions and associated environmental impacts. TUBA, COBALT and REM all utilise outputs derived from the transport model as a key input to the appraisal process.

9. Uncertainty in Travel Demand Projections

9.1 Overview

Alternative scenarios should be used to test the sensitivity of a scheme to uncertainties in future travel demand, travel patterns, land use, technology, policy and wider societal trends. The purpose of scenario testing is not to predict a specific future, but to assess whether the proposed intervention remains appropriate under a range of plausible future conditions.

9.2 Definition of Alternative Scenarios

Scenario development should at the minimum:

- Consider the key uncertainties that could materially affect scheme performance;
- Explore plausible variations from the Central Growth Scenario;
- Define the upper and lower bounds of future demand and travel behaviour where appropriate;
- Test the robustness of the proposed intervention under different future conditions; and
- Identify whether the preferred option would require adaptation under alternative futures.

The specific scenarios tested should be proportionate to the scale, complexity and risk associated with the scheme. Scheme promoters should use available evidence, policy documents, professional judgement and stakeholder input when selecting scenarios.

As a minimum, the following aspects should be considered when developing alternative scenarios:

- Population and employment growth;
- Distribution of development and land use patterns;
- Trip rates and travel demand;
- Mode share;
- Journey length and trip distribution;
- Travel costs;
- Remote and flexible working patterns;
- Freight activity;
- Technological change; and
- National, regional or local policy interventions.

9.3 Assessment of Alternative Scenarios

For each alternative scenario, scheme promoters should clearly document the assumptions adopted, the rationale for their selection, and the changes made to model inputs.

Table 9.1 Scenario Testing Summary and Key Findings

Scenario Name	Key Uncertainty Being Tested	Assumptions Applied	Expected Impact on Travel Demand/ Patterns	Model Changes Undertaken	Key Findings
Central Growth Scenario					
Alternative Scenario 1					
Alternative Scenario 2					

The assessment report should describe how each scenario was developed and present the resulting impacts on network performance, scheme objectives and economic performance. Where significant differences are identified between scenarios, the implications for scheme design, phasing, operation or future adaptability should be discussed.

The alternative scenarios are additional to the TII PAG low, central, and high projections used for base case appraisal and sensitivity analysis.

Scheme promoters must ensure a robust appraisal is undertaken to the satisfaction of the TII Strategic and Transport Planning Section. Assistance can be provided by TII in order to incorporate one of these alternative scenarios into scheme appraisal as required.

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