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Transport Infrastructure Ireland

# TII Publications

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## Project Appraisal Guidelines Unit 6.11 - National Parameters Values Sheet

PE-PAG-02030  
December 2023

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## TII Publications



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<b>Activity:</b>	Planning & Evaluation (PE)
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## Contents Table

1. Introduction .....	1
2. Central Government Parameters .....	3
3. Transport Specific Parameters .....	6
4. Road Safety Parameters .....	10
5. Active Travel Parameters .....	13
6. Traffic Input Parameters .....	15
7. General Appraisal Parameters .....	18
8. Motorway Service Area Parameters .....	19
9. Data Sources .....	20

**Updates to TII Publications resulting in changes to**

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**Amendment Details:**

This guidance document is an update of PE-PAG-02030 dated October 2016. This updated document now incorporates the new central government economic appraisal parameters published by the Department for Public Expenditure and Reform in July 2019. The main changes to this document are:

- a) Table 1 includes the updated central government social discount rates and shadow prices
- b) Table 13 has been updated to incorporate the new parameter values for the shadow price of public carbon
- c) Table 14 has been updated with new Non-Greenhouse Gas Emissions Damage Costs

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Updated with adjusted Department of Transport values of time as described in Circular SRA 01/2020.

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Annual growth factor (2010 – 2014) in Table 4 and Table 7 updated to the correct value as per Department of Transport Common Appraisal Framework

Table 8 updated to present values in cents per litre

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All economic parameter values updated to align with the Department of Transport, Transport Appraisal Framework (TAF) June 2023.

## Contents Table

<b>1. Introduction</b> .....	<b>1</b>
1.1 Appraisal Parameters .....	1
1.2 Perceived Costs and Units of Account.....	1
1.3 PAG Unit Structure .....	1
<b>2. Central Government Parameters</b> .....	<b>3</b>
<b>3. Transport Specific Parameters</b> .....	<b>6</b>
<b>4. Road Safety Parameters</b> .....	<b>10</b>
<b>5. Active Travel Parameters</b> .....	<b>13</b>
<b>6. Traffic Input Parameters</b> .....	<b>15</b>
<b>7. General Appraisal Parameters</b> .....	<b>18</b>
<b>8. Motorway Service Area Parameters</b> .....	<b>19</b>
<b>9. Data Sources</b> .....	<b>20</b>

# 1. Introduction

The National Parameters Value Sheet summarises the values for the economic and traffic related parameters to be used in the economic appraisal and Cost Benefit Analysis (CBA) of transport projects in Ireland.

## 1.1 Appraisal Parameters

Module 8 of the Department of Transport (DoT) Transport Appraisal Framework (TAF) provides detailed guidance on appraisal parameters and their use in the preparation of economic analysis for public capital investment proposals. These parameters are set out in this PAG Unit and should be adhered to by practitioners when appraising TII projects. The rationale for the potential use of non-standard parameters must be outlined in the Project/Programme Outline Document at Phase 0 and be agreed with TII. Any economic assessment or CBA that uses non-standard parameters should only be included as a sensitivity test within the appraisal process unless otherwise agreed with TII.

## 1.2 Perceived Costs and Units of Account

As set out in the DoT TAF, expressing costs and benefits in a consistent unit of account is a key step in CBA. However, different transport network users can perceive costs and benefits in different units of account. For example, vehicle operating costs are perceived as lower for businesses than for individual consumers; businesses can deduct elements of indirect taxation (i.e., VAT) which consumers cannot. These lower costs, net of indirect taxation, are effectively perceived in the 'Factor Cost' unit of account. Many of the values used in transport CBA are based on estimates of people's willingness-to-pay, which are expressed in Market Prices.

The recommended approach is thus for costs and benefits to ultimately be expressed in the 'Market Price' unit of account. This is also the standard unit of account used in transport CBA software packages such as TUBA.

To achieve this, an indirect tax correction factor (1+t) should be used to convert all values estimated in factor costs to market prices. The figure to be used for t (the average rate of indirect tax on final consumption) is 16 per cent (t = 0.16). Within sections of this PAG Unit, certain parameters are presented as Factor Cost or Market Prices. As outlined above the relationship between Market Prices and Factor Costs, may be defined as follows:

$$\text{Market Price} = 1.16 * \text{Factor Cost}$$

The TUBA software takes the above indirect tax correction factor as an input parameter. The software takes inputs, such as the value of time, in perceived costs (e.g. factor costs for business users). When calculating outputs, TUBA applies the corrections as necessary to output all costs and benefits in the market price unit of account. These principles are incorporated into the TUBA input files provided in *PAG Unit 6.3 – Guidance on using TUBA*.

## 1.3 PAG Unit Structure

This PAG Unit provides details of various economic and transport related parameters used in the appraisal of Irish transport projects, it does not provide any details or guidance on the use of these parameters or appraisal techniques. This document is split into the following sections:

- Section 2 – Central Government Parameters

- Section 3 – Transport Specific Parameters
- Section 4 – Road Safety Parameters
- Section 5 – Road Traffic Parameters
- Section 6 – Motorway Service Area Parameters
- Section 7 – Active Travel Parameters
- Section 8 – General Appraisal Parameters
- Section 9 – Data Sources



## 2. Central Government Parameters

Table 6.11.1 Price Base Year

<b>Year</b>	2016
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Table 6.11.2 Indirect Taxation Correction Factor

<b>Factor Cost to Market Prices</b>	1.16
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Table 6.11.3 Discount Rates

<b>Funding Stream</b>	<b>Sub-Classification</b>
0-30	4.0%
31-60	3.5%
61-100	3.0%
101-175	2.5%
176-275	2.0%
276+	1.5%

Table 6.11.4 Shadow Price of Public Funds

<b>Shadow Price</b>	<b>Cost Multiplier</b>
Public Funds	1.3

Table 6.11.5 Shadow Price of Labour

<b>Shadow Price</b>	<b>Wage Cost Multiplier</b>
Labour	0.8 – 1.0

Table 6.11.6 Shadow Price of Carbon (per tonne of CO<sub>2</sub>e<sup>1</sup>) for Non-Emissions Trading Sector € (2016 Prices)

<b>Year</b>	<b>Price per tonne of CO<sub>2</sub>e</b>
2016 - 2019	€ 19.94
2020	€ 31.90
2021	€ 38.88

<sup>1</sup> Carbon Dioxide Equivalent – Carbon Dioxide (CO<sub>2</sub>), Methane (CH<sub>4</sub>), Nitrous Oxide (N<sub>2</sub>O), Sulphur Hexafluoride (SF<sub>6</sub>), Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs) and Nitrogen Trifluoride (NF<sub>3</sub>)

Year	Price per tonne of CO <sub>2</sub> e
2022	€ 45.86
2023	€ 51.84
2024	€ 58.82
2025	€ 65.80
2026	€ 72.78
2027	€ 79.76
2028	€ 85.74
2029	€ 92.72
2030	€ 99.70
2031	€ 104.69
2032	€ 109.67
2033	€ 115.65
2034	€ 121.63
2035	€ 127.62
2036	€ 133.60
2037	€ 140.58
2038	€ 147.56
2039	€ 154.54
2040	€ 162.51
2041	€ 170.49
2042	€ 179.46
2043	€ 188.43
2044	€ 197.41
2045	€ 207.38
2046	€ 217.35
2047	€ 228.31
2048	€ 240.28
2049	€ 252.24
2050	€ 264.21
2050+	€ 264.21

**Table 6.11.7 Non-Greenhouse Gas Emissions Estimated Average Damage Costs per kg € (2016 Market Prices)**

Emissions Type		Price per Kg
Particulate Matter (PM)2.5	City	€ 183.0
	Metropole	€ 568.0
	Rural	€ 68.0
Non-Methane Volatile Organic Compounds (NMVOCs)		€ 1.7
Sulphur Dioxide (SO2)		€ 11.8
PM10		€ 12.2
Nitrogen Oxides (NOx)	City	€ 17.6
	Rural	€ 10.1

**Table 6.11.8 Inflation Calculations**

<b>Consumer Price Index (CPI)</b>	Use Central Statistics Office (CSO) Inflation Calculator
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### 3. Transport Specific Parameters

Table 6.11.9 Value of Travel Time (VTT) (2016 Prices)

Work (Factor Cost)	Non-Work (Market Prices)	
€26.16	Commuting	Other
	€8.90	€8.01

Table 6.11.10 Value of Travel Time Growth Factors (Annual<sup>2</sup>)

Year	Annual Growth Factor
2016 - 2019	1.049
2020 - 2024	1.022
2025 - 2030+	1.023

Table 6.11.11 Journey Reliability Parameters

	Commuting	Business	Other non-work	Sensitivity
Private Car (Reliability Ratio)	0.8	0.8	0.8	0.4
Bus/Luas/Metro (Lateness Multiplier)	2.9	2.8	2.5	2.0
Heavy Rail (Lateness Multiplier)	2.9	2.8	3.2	2.0

<sup>2</sup> An annual growth factor of 1.01 equates to a growth of 1% per annum.

**Table 6.11.12 Journey Quality Multipliers for Public Transport**

<b>Bus</b>	<b>Commute</b>	<b>Business</b>	<b>Other</b>
Plenty of seats free and did not have to sit next to anyone	0.85	0.83	0.83
A few seats free but had to sit next to someone/could not sit with people travelling with	0.89	0.84	0.84
A few seats free but had to sit next to someone/could not sit with people travelling with. Some standing	1.00	1.00	1.00
No seats free – a few others standing	1.24	1.3	1.3
No seats free – densely packed	2.14	2.32	2.32
<b>Other Public Transport</b>	<b>Commute</b>	<b>Business</b>	<b>Other</b>
Plenty of seats free and did not have to sit next to anyone	0.95	1.00	1.00
A few seats free but had to sit next to someone/could not sit with people travelling with	0.97	1.00	1.00
A few seats free but had to sit next to someone/could not sit with people travelling with. Some standing	1.00	1.00	1.00
No seats free – a few others standing	1.13	1.17	1.10
No seats free – densely packed.	1.7	1.78	1.87
<b>Heavy Rail</b>	<b>Commute</b>	<b>Business</b>	<b>Other</b>
- Seated Passengers			
Seated 50% load	0.73	0.75	0.72
Seated 75% load	0.79	0.76	0.72
Seated 100% load	1	1	1
Seated - 1 passenger standing per m <sup>2</sup>	1.09	1.13	1.14
Seated - 3 or more passengers standing per m <sup>2</sup>	1.31	1.36	1.39
- Standing Passengers			
Standing - 0.5 passengers standing per m <sup>2</sup>	1.16	1.29	1.21
Standing - 1 passengers standing per m <sup>2</sup>	1.19	1.38	1.27
Standing - 2 passengers standing per m <sup>2</sup>	1.32	1.56	1.57
Standing - 3 passengers standing per m <sup>2</sup>	1.57	1.61	1.79
Standing - 4 passengers standing per m <sup>2</sup>	1.86	2.03	2.17

**Table 6.11.13 Fuel Consumption Function**

<b>Fuel Consumption Function</b>	$L = a/v + b + c*v + d*v^2$ <p>Where:                      L = consumption (litre/km)                      v = average speed (km/hr)                      a, b, c, and d = fuel consumption parameters</p>
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**Table 6.11.14 Fuel Consumption Parameters**

	a	b	c	D
Petrol Car	0.5155	0.06767	-0.0007362	0.000005619
Diesel Car	0.4229	0.06613	-0.0006266	0.000004798
Electric Car <sup>3</sup>		0.221		
Petrol LGV	0.2535	0.2081	-0.0033072	0.0000212
Diesel LGV	0.218	0.13917	-0.0023135	0.000018692
Electric LGV		0.259		
OGV1	2.5876	0.11176	-0.0006445	0.000009922
OGV2	5.0715	0.34664	-0.0027069	0.000014479

**Table 6.11.15 Fuel Costs<sup>4</sup> (2016 Price)**

Fuel	Factor Cost (cents per litre)	Market Price (cents per litre)
Cost of Petrol	47.4	130.6
Cost of Diesel	50	120.7

**Table 6.11.16 Vehicle Operating Costs Growth Rate (Fuel Price Growth)**

Period	Annual Growth Rate <sup>5</sup>	
	Petrol	Diesel
2016 - 2021	1.07	1.07
2021 +	1.00	1.00

**Table 6.11.17 Vehicle Operating Cost (Non-Fuel) (Factor Cost 2016)**

Vehicle Category		Non-Fuel Parameters	
		a1 (cents/km)	b1 (cents/hr)
Car	Work Petrol	6.79	185.88
	Work Diesel	6.79	185.88

<sup>3</sup> Fuel consumption parameters for both electric car and electric LGV are the same as the UK's TAG 2015 values and are in kWh per km. It is assumed that the composition of the EV fleet in the UK is similar to that of the current EV fleet in Ireland.

<sup>4</sup> Market price on fuel costs is estimated with factor cost values and include Duty Tax and Value Added Tax (VAT) details

<sup>5</sup> An annual growth factor of 1.01 equates to a growth of 1% per annum.

Vehicle Category		Non-Fuel Parameters	
		a1 (cents/km)	b1 (cents/hr)
	Work Electric	1.58	185.88
	Non-Work Petrol	5.97	-
	Non-Work Diesel	5.97	
	Non-Work Electric	1.80	
LGV	Work	9.86	64.42
	Work Electric	2.97	64.42
	Non-Work	11.19	-
	Non-Work Electric	3.37	
OGV1	Work	9.18	360.71
OGV2	Work	17.86	695.30
PSV	Work	41.65	949.64

**Table 6.11.18 Vehicle Operating Costs Growth Rate (Non-Fuel Price Growth)**

Period	Annual Growth Rate	
	a1 (cents/km)	b1 (cents/hr)
2016 - 2019	0.999	1.000
2020 - 2024	0.998	1.000
2025 - 2030+	0.996	1.000
2031+	1.000	1.000

## 4. Road Safety Parameters

**Table 6.11.19 Average Value of Prevention of Road Collisions by Severity and Element of Cost € (2016 Prices & 2016 Values Market Prices)**

Collision Severity	Casualty Related Costs			Collision Related Costs			Total
	Lost Output	Human Costs	Medical & Ambulance	Gardaí Cost	Damage to Property	Insurance & Admin	
Fatal	180,475	2,548,445	8,022	25,212	15,551	428	2,778,132
Serious	34,449	252,991	20,692	2,937	7,039	266	318,373
Slight	4,162	21,352	1,766	758	4,147	162	32,346
All Injury	12,689	103,206	5,627	1,538	4,885	186	128,131
Damage Only	-	-	-	50	2,658	77	2,785

**Table 6.11.20 Average Value of Prevention of Road Collisions by Severity and Road Class € (2016 Prices & 2016 Market Values)**

Collision Severity	Road Class			
	Built-Up	Non-Built-Up	Motorway	Standard
Fatal	2,536,965	2,653,430	2,612,264	2,778,132
Serious	289,594	327,741	333,657	318,373
Slight	42,551	32,346	42,551	32,346
All Injury	151,574	128,131	151,574	128,131
Damage Only	3,721	2,785	3,721	2,785

**Table 6.11.21 Value of Prevention of Road Collisions Growth Factors**

Year	Annual Growth Factor
2016 - 2019	1.049
2020 - 2024	1.022
2025 - 2030+	1.023



**Table 6.11.22 Link and Junction Combined Collision Rates**

Road Type	Collision Rate PIC/mvkm	
Motorway	0.020	
Speed Limit	≤ 60 kph	> 60 kph
	PIC/mvkm	PIC/mvkm
2 Lane Single Carriageway	0.213	0.080
Dual Carriageway	0.140	0.033
2+1 without Central Reserve Barrier	0.213	0.080
2+1 with Central Reserve Barrier	0.140	0.033
1 Way	0.156	-

**Table 6.11.23 Link and Junction Combined Collision Proportions**

Road Type	Collision Proportions					
	Fatal			Serious		Minor
Motorway	0.038			0.051		0.911
Speed limit	≤ 60 kph			> 60 kph		
Casualty severity	Fatal	Serious	Minor	Fatal	Serious	Minor
2 Lane single carriageway	0.014	0.062	0.924	0.062	0.096	0.842
Dual Carriageway	0.024	0.054	0.922	0.035	0.049	0.916
2+1 without Central Reserve Barrier	0.014	0.062	0.924	0.062	0.096	0.842
2+1 with Central Reserve Barrier	0.024	0.054	0.922	0.035	0.049	0.916
1 Way	0.014	0.062	0.924	-	-	-

**Table 6.11.24 Average Number of Casualties per Collision**

Road Type	Casualties per PIC					
	Fatal			Serious		Minor
Motorway	0.072			0.063		1.322
Speed limit	≤ 60 kph			> 60 kph		
Casualty severity	Fatal	Serious	Minor	Fatal	Serious	Minor
2 Lane single carriageway	0.021	0.097	1.272	0.021	0.097	1.272
Dual Carriageway	0.024	0.087	1.180	0.024	0.087	1.180
2+1 without Central Reserve Barrier	0.021	0.097	1.272	0.021	0.097	1.272

Road Type	Casualties per PIC					
	Fatal		Serious		Minor	
2+1 with Central Reserve Barrier	0.024	0.087	1.180	0.024	0.087	1.180
1 Way	0.021	0.097	1.272	0.021	0.097	1.272

**Table 6.11.25 Collision Reduction ( $\beta$ ) Factors**

Road Type	Collision Type	Collision Rate Reduction Factor	
<b>Motorway</b>	<b>1</b>	<b>0.956</b>	
Speed Limit		$\leq 60$ kph	$> 60$ kph
2 Lane Single Carriageway	4	0.959	0.955
2+1 without Central Reserve Barrier	5	0.959	0.955
1 Way	8	0.959	0.955
Dual Carriageway	10	0.967	0.956
2+1 with Central Reserve Barrier	11	0.959	0.955
Road Type	Collision Type	Casualties per Collision Change Factor Fatal, Serious, Minor	
Motorway	1	0.978,0.979,1.002	
Speed Limit		$\leq 60$ kph	$> 60$ kph
2 Lane Single Carriageway	4	0.971,0.995,1.001	0.979,0.983,1.002
2+1 without Central Reserve Barrier	5	0.971,0.995,1.001	0.979,0.983,1.002
1 Way	8	0.971,0.995,1.001	0.979,0.983,1.002
Dual Carriageway	10	0.998,0.99,1.002	0.984,0.985,0.998
2+1 with Central Reserve Barrier	11	0.971,0.995,1.001	0.979,0.983,1.002

## 5. Active Travel Parameters

**Table 6.11.26 Active Travel Impacts in Cost Benefit Analysis**

Active Travel Impact	User Category
Relative Risk Reduction	New Cyclists
	New Pedestrians
Anticipated Turnover	New Cyclists
	New Pedestrians
Reduced Absenteeism	New Cyclists
	Existing Cyclists

**Table 6.11.27 Relative Risk Parameters**

Mode	Applicable Age Range	Relative Risk (Confidence Interval)	Volume	Benefits Capped at
Cycling	20-64 years	0.9	100 minutes/week	45%
		(CI 0.87–0.94)		(447 minutes per week)
Walking	20-74 years	0.89	100 minutes/week	30%
		(CI 0.83–0.96)		(460 minutes per week)

**Table 6.11.28 Average Active Travel Speed**

Mode	Average Speed (km/h)
Foot	5 km/h
Bicycle	16 km/h

**Table 6.11.29 Average Active Travel Journey Times**

Mode	Trip Maker Class	Journey Time (mins)		Distance Travelled (km)	
		One Way	Return	One Way	Return
Foot	All Persons	14.2	28.4	1.2	2.4
	Students at School or College aged 19 and over	16.6	33.2	1.4	2.8
	Population aged 15 and over at work	16.3	32.6	1.4	2.7
	Recreational Users Trip	-	45	-	3.8

Mode	Trip Maker Class	Journey Time (mins)		Distance Travelled (km)	
		One Way	Return	One Way	Return
Bicycle	All Persons	20.6	41.2	5.5	11.0
	Students at School or College aged 19 and over	19.9	39.8	5.3	10.6
	Population aged 15 and over at work	22.6	45.2	6.0	12.1
	Recreational Users Trip	-	60	-	16

**Table 6.11.30 Cycling Commuters' Incremental Willingness to Pay values per minute € (2016 Prices)**

Scheme Type	Cents per min	Cents
Off-Road Segregated Cycle Track	10.42	:
On-Road Segregated Cycle Track	4.43	:
On-Road Non-Segregated Cycle Track	4.40	:
Wider Lane	2.68	:
Shared Bus Lane	1.14	:
Secure Cycling Parking Facilities	:	145.44
Changing and Shower Facilities	:	30.85

**Table 6.11.31 Recreational Users' Incremental Willingness to Pay values per minute € (2016 Prices)**

Scheme Type	Pedestrians	Cyclists
	Cents per min	Cents per min
Greenway / off-road segregated	2.37	7.57
On-road segregated cycle lane	0.00	5.08
On-road non-segregated cycle lane	0.00	2.24
Wider lane	0.00	1.12
Shared bus lane	0.00	1.02

## 6. Traffic Input Parameters

Table 6.11.32 Annual Average Category Proportions by Class of Road (2016)

Network Classification	CARS (1)	LGV (2)	OGV1 (3)	OGV2 (4)	PSV (5)
Motorway	82.97%	8.81%	2.99%	4.77%	0.65%
National Primary	85.65%	8.28%	2.50%	2.97%	0.59%
National Secondary	85.67%	8.46%	3.16%	2.34%	0.36%

Table 6.11.33 Vehicle Category Proportion Correction Factors

Road Type and Flow Group		Vehicle Type			
		LGV (2)	OGV1 (3)	OGV2 (4)	PSV (5)
Motorway (MWY)	2	1.193	1.305	1.270	1.116
	3	1.082	1.015	0.895	0.880
	4	1.036	0.854	0.713	0.781
	7	0.640	0.514	0.361	0.852
	8	0.598	0.430	0.273	0.706
	9	0.588	0.420	0.271	0.691
National Primary (TNB)	2	1.168	1.211	1.319	1.072
	3	1.102	1.045	0.958	0.908
	4	1.030	0.907	0.727	0.838
	7	0.675	0.621	0.312	1.065
	8	0.624	0.569	0.224	0.863
	9	0.619	0.563	0.198	0.826
National Primary (TBU)	2	1.147	1.237	1.238	1.122
	3	1.082	1.180	0.967	0.916
	4	1.030	1.026	0.753	0.805
	7	0.698	0.691	0.268	0.877
	8	0.666	0.741	0.224	0.775
	9	0.680	0.745	0.198	0.790
National Secondary (PNB)	2	1.158	1.300	1.358	1.080
	3	1.112	1.126	1.049	1.048
	4	1.049	0.898	0.783	0.968

Road Type and Flow Group		Vehicle Type			
		LGV (2)	OGV1 (3)	OGV2 (4)	PSV (5)
	7	0.680	0.500	0.300	1.015
	8	0.640	0.441	0.255	0.930
	9	0.611	0.399	0.217	0.866
National Secondary (PNB)	2	1.169	1.408	1.394	1.124
	3	1.072	1.074	0.944	1.015
	4	1.046	0.966	0.817	0.899
	7	0.671	0.498	0.274	0.853
	8	0.635	0.429	0.218	0.800
	9	0.580	0.381	0.168	0.721

**Table 6.11.34 Vehicle Occupancy Rates, by Flow Group and Time Modes**

Vehicle Type	Person Mode	Flow Group							
		1	2	3	4	6	7	8	9
Car	Work	1.24	1.25	1.26	1.26	1.33	1.34	1.38	1.38
	Commuting	1.21	1.22	1.23	1.23	1.20	1.23	1.22	1.22
	Other Non-Work	1.64	1.65	1.66	1.68	1.70	1.83	1.85	1.85
LGV	Work	1.36	1.32	1.37	1.38	1.42	1.42	1.42	1.42
	Commuting	1.40	1.41	1.40	1.40	1.95	1.95	1.95	1.95
	Other Non-Work	1.47	1.45	1.49	1.48	2.05	2.05	2.05	2.05
OGV1	Work	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09
	Commuting	1.25	1.28	1.24	1.24	1.25	1.25	1.25	1.25
	Other Non-Work	1.29	1.33	1.26	1.27	1.29	1.29	1.29	1.29
OGV2	Work	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03
	Commuting	1.11	1.14	1.11	1.08	1.11	1.11	1.11	1.11
	Other Non-Work	1.13	1.12	1.11	1.16	1.13	1.13	1.13	1.13
PSV	Work	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35
	Commuting	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
	Other Non-Work	9.35	9.35	9.35	9.35	9.35	9.35	9.35	9.35

Note: There are eight flow groups, four for weekday (groups 1-4) and four for the weekend (groups 6-9). Flow Group 1 = Ordinary Flow Group (overnight off peak), Flow Group 2 = Adjacent to Peak Flow Group, Flow Group 3 = AM Peak Flow Group, Flow Group 4 = PM Peak Flow Group. There are four weekend groups; Flow Group 6 = Ordinary Flow Group (overnight off peak), Flow Group 7 = Ordinary Flow Group (off peak), Flow Group 8 = Adjacent to Peak Flow Group, Flow Group 9 = Peak Flow Group. If tidality is considered, flow groups 4 and 9 are split creating flow groups 5 and 10 with the same level of flow as the original flow

## 7. General Appraisal Parameters

**Table 6.11.35 Standard Appraisal Period**

Parameter	Value
Appraisal Period	30 years <sup>6</sup>

**Table 6.11.36 Maintenance Costs (Factor Costs, 2016 Prices)**

Road Type	COBA Maintenance Type	Maintenance Cost (€1,000/km/year)
Standard 2-lane with H/S	1	18,837
2+1 with central reserve	2	30,859
2+1 without central reserve	1	18,837
Dual Carriageway/Motorway	3	42,879

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<sup>6</sup> For large projects with long preparation time horizons, the 30-year appraisal period should begin from the year in which benefits accrue, with the appraisal also including the years when costs commence. A large capital project with a four-year construction period should be appraised over a 34-year period (4+30). Residual value should be utilised where appropriate based on design life of the scheme, further information is available in Unit 6.1



## 8. Motorway Service Area Parameters

Table 6.11.37 MSA Parameters

Parameter	Value
Anticipated Turn in Rates	7% - 12%
Anticipated Turnover	€10,000,000 per 1,000 AADT in the MSA
Net Revenue	10% of Total Turnover
Operation & Maintenance Costs	Anticipated to range between 4% - 8% of total turnover

## 9. Data Sources

**Table 6.11.38 TII Roads Capital/Maintenance Funding Streams**

Parameter	Source
Table 6.11.1 Price Base Year	DoT TAF (June 2023) – Module 8 Detailed Guidance on Appraisal Parameters Section 8.1.7
Table 6.11.2 Indirect Taxation Correction Factor	DoT TAF (June 2023) – Module 8 Detailed Guidance on Appraisal Parameters Section 8.1.6
Table 6.11.3 Discount Rates	DoT TAF (June 2023) – Module 8 Detailed Guidance on Appraisal Parameters Table 1: Central Government Discount Rates
Table 6.11.4 Shadow Price of Public Funds	DoT TAF (June 2023) – Module 8 Detailed Guidance on Appraisal Parameters Table 2: Shadow Price of Public Funds
Table 6.11.5 Shadow Price of Labour	DoT TAF (June 2023) – Module 8 Detailed Guidance on Appraisal Parameters Table 3: Shadow Price of Labour
Table 6.11.6 Shadow Price of Carbon (per tonne of CO <sub>2</sub> e) for Non-Emissions Trading Sector € (2016 Prices)	DoT TAF (June 2023) – Module 8 Detailed Guidance on Appraisal Parameters Table 4: Shadow Price of Carbon (non-ETS)
Table 6.11.7 Non-Greenhouse Gas Emissions Estimated Average Damage Costs per kg € (2016 Market Prices)	DoT TAF (June 2023) – Module 8 Detailed Guidance on Appraisal Parameters Table 5: Estimated Average Damage Cost per kg in 2016€
Table 6.11.8 Inflation Calculations	Central Statistics Office – Consumer Price Index (CPI) Section 8.7.1
Table 6.11.9 Value of Travel Time (VTT) (2016 Prices)	DoT TAF (June 2023) – Module 8 Detailed Guidance on Appraisal Parameters Table 6: Value of Travel Time(€ per hour, 2016 prices and inputs)
Table 6.11.10 Value of Travel Time Growth Factors (Annual)	DoT TAF (June 2023) – Module 8 Detailed Guidance on Appraisal Parameters, Table 7: Forecast Growth in GNP per employed person


Parameter	Source
Table 6.11.11 Journey Reliability Parameters	DoT TAF (June 2023) – Module 8 Detailed Guidance on Appraisal Parameters, Table 8: Journey Time Reliability Parameters
Table 6.11.12 Journey Quality Multipliers for Public Transport	DoT TAF (June 2023) – Module 8 Detailed Guidance on Appraisal Parameters, Table 9: Journey Quality Multipliers for Public Transport
Table 6.11.13 Fuel Consumption Function	DoT TAF (June 2023) – Module 8 Detailed Guidance on Appraisal Parameters, Section 8.11.2
Table 6.11.14 Fuel Consumption Parameters	DoT TAF (June 2023) – Module 8 Detailed Guidance on Appraisal Parameters, Table 10: Fuel Consumption Parameters
Table 6.11.15 Fuel Costs (2016 Price)	Factor Costs - Office of the Revenue Commissioners – Incidence of Duty and VAT per Litre of Unleaded Petrol and of Auto Diesel  Market Prices - DoT TAF (June 2023) – Module 8 Detailed Guidance on Appraisal Parameters, Table 11: Fuel Costs (2016 cents per litre)
Table 6.11.16 Vehicle Operating Costs Growth Rate (Fuel Price Growth)	Advice from AECOM Economics due to lack of accurate forecasts. Future vehicle operating costs are estimated using the current price of fuel. All forecasting is done in real terms, that is at 2016 prices, so this is equivalent to assuming that the price of fuel will rise in line with general price levels in the future. The actual price of fuel is more volatile than this and will rise and fall in real terms over time. However, in the absence of a reliable model of the future energy market in Ireland the best assumption to make is that, on average, fuel prices will remain constant in real terms.
Table 6.11.17 Vehicle Operating Cost (Non-Fuel) (Factor Cost 2016)	DoT TAF (June 2023) – Module 8 Detailed Guidance on Appraisal Parameters, Table 12: Non-Fuel Operating Costs (2016€)
Table 6.11.18 Vehicle Operating Costs Growth Rate (Non-Fuel Price Growth)	U.K WebTAG as not available in CAF (2016)
Table 6.11.19 Average Value of Prevention of Road Collisions by Severity and Element of Cost € (2016 Prices & 2016 Values Market Prices)	DoT TAF (June 2023) – Module 8 Detailed Guidance on Appraisal Parameters Table 13: Average Value of Prevention of Road Collision by Severity and Element of Cost (€2016 Prices & 2016 Values)

Parameter	Source
Table 6.11.20 Average Value of Prevention of Road Collisions by Severity and Road Class € (2016 Prices & 2016 Market Values)	DoT TAF (June 2023) – Module 8 Detailed Guidance on Appraisal Parameters Table 14: Average Value of Prevention of Road Collision by Severity and Road Class € (2016 Prices & 2016 Values)
Table 6.11.21 Value of Prevention of Road Collisions Growth Factors	DoT TAF (June 2023) – Module 8 Detailed Guidance on Appraisal Parameters, Table 7: Forecast Growth in GNP per employed person
Table 6.11.22 Link and Junction Combined Collision Rates	Based on historical data from Road Safety Authority and traffic demand data from TII NTpM
Table 6.11.23 Link and Junction Combined Collision Proportions	Based on historical data from Road Safety Authority and traffic demand data from TII NTpM
Table 6.11.24 Average Number of Casualties per Collision	Based on historical data from Road Safety Authority and traffic demand data from TII NTpM
Table 6.11.25 Collision Reduction ( $\beta$ ) Factors	Based on TRL/Smeeds Law Research
Table 6.11.26 Active Travel Impacts in Cost Benefit Analysis	DoT TAF (June 2023) – Module 8 Detailed Guidance on Appraisal Parameters Table 15: Active Travel Impacts in Cost-Benefit Analysis
Table 6.11.27 Relative Risk Parameters	Health Economic Assessment Tool (WHO, 2017)
Table 6.11.28 Average Active Travel Speed	TII TEAM Tool (based on NTA 'RM Spec4 Active Modes Model Specification Report' and research carried out on users of urban greenways in Dublin (O'Driscoll, 2019))
Table 6.11.29 Average Active Travel Journey Times	DoT TAF (June 2023) and TEAM Tool (based on CSO Quarterly National Household Survey 'Special module on Sport' 2013 (Recreational Users Trip))
Table 6.11.30 Cycling Commuters' Incremental Willingness to Pay values per minute € (2016 Prices)	DoT TAF (June 2023) – Module 8 Detailed Guidance on Appraisal Parameters Table 18: Value of Journey Ambience Benefit of Cycle Facilities Relative to No Facilities (2016 €)
Table 6.11.31 Recreational Users' Incremental Willingness to Pay values per minute € (2016 Prices)	TII TEAM tool (September 2023)
Table 6.11.32 Annual Average Category Proportions by Class of Road (2016)	Calculated based on first principles from TII TMU data
Table 6.11.33 Vehicle Category Proportion Correction Factors	Not available in CAF (2016), unchanged from 2011 PAG
Table 6.11.34 Vehicle Occupancy Rates, by Flow Group and Time Modes	CAF (March 2016) – Updated 10th July 2019

<b>Parameter</b>	<b>Source</b>
Table 6.11.35 Standard Appraisal Period	TII PAG Unit 6.1 – Guidance on Conducting CBA
Table 6.11.36 Maintenance Costs (Factor Costs, 2011 Prices)	Transport Research Laboratory as part of COBA Ireland development, adjusted to 2016 prices using CPI index from CSO
Table 6.11.37 MSA Parameters	Based on surveys undertaken on behalf of TII





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