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Project Appraisal Guidelines for National Roads Unit 6.5 - TUBA and COBALT Sample Input Files

PE-PAG-02024
October 2016

PE Planning & Evaluation

Technical

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TII Publications

Activity:	Planning & Evaluation (PE)
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Updates to TII Publications resulting in changes to

Project Appraisal Guidelines for National Roads Unit 6.5 - TUBA and COBALT Sample Input Files PE-PAG-02024

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Amendment Details:

Inconsistency in values in terms of CAF

1. Overview

Sample input files for TUBA and COBALT are provided within this Unit in the following order:

- TUBA Scheme Input Sample
- TUBA Economics Input
- COBALT Ireland Input Sample
- COBALT Ireland Parameters.

These files can also be downloaded from the “Downloads” section of the TII Publications website under section PE-PAG-02023_Unit 6.5.

SCHEME SPECIFIC PARAMETERS

PARAMETERS

TUBA_version	1.9
run_name	Sample Project
do_min_name	Do Min
do_som_name	RCO 01
first_yr	2024
horizon_yr	2083
modelled_yrs	2024 2039 2054
detail	Yes
current_yr	2014
print_warn	5.0
P&R_car_speed	65.0
zones_as_sectors	No

TIME_SLICES

*no.	duration(min)	annualisation	period	description
1	60	633	1	0800-0900
2	60	2190	2	1200-1400
3	60	734	3	1700-1800

SCHEMES_DM

*Mode	1st Construction year	Opening_yr	Stage

DO_MIN_COSTS

*Type	Mode	Funding	Cost	Price	RPI

DO_MIN_PROFILE

*Year	Mode	%Const	%Land	%Prep	%Super	%Maint	%Op	%Grant	%Dev

DO_MIN_DELAY_COSTS

*Year	Mode	Business	Commuting	Other	Freight

SCHEMES_DS

*Mode	1st Construction year	Opening_yr	Stage
1	2022	2024	OP
2	2022	2024	OP

DO_SOM_COSTS

*Type	Mode	Funding	Cost	Price	RPI
C	1	cen	215229.2	F	100.00
S	1	cen	10179.3	F	100.00
L	1	cen	60450.2	F	100.00
P	1	cen	10892.0	F	100.00

DO_SOM_PROFILE

*Year	Mode	%Const	%Land	%Prep	%Super	%Maint	%Op	%Grant	%Dev
2014	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2015	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2016	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2017	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2018	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2019	1	2.3	0.0	75.0	0.0	0.0	0.0	0.0	0.0
2020	1	20.5	30.0	15.0	20.0	0.0	0.0	0.0	0.0
2021	1	28.5	30.0	10.0	30.0	0.0	0.0	0.0	0.0

```
 2022    1      28.0      10.0       0.0      30.0       0.0       0.0       0.0
      0.0
 2023    1      14.6      10.0       0.0      15.0       0.0       0.0       0.0
      0.0
 2024    1       5.5      10.0       0.0       5.0       0.0       0.0       0.0
      0.0
 2025    1       0.6      10.0       0.0       0.0       0.0       0.0       0.0
      0.0

DO_SOM_DELAY_COSTS
*Year  Mode     Business        Commuting       Other   Freight

BENEFIT_CHANGE
*% change p.a.
*Start_yr   End_yr   Submode ChangePer1 ChangePer2 ChangePer3 ChangePer4
ChangePer5

USER_CLASSES
*no.             Veh/submode     purpose        person_type
   1              1              0              0
   2              1              0              0
   3              3              0              0

INPUT_MATRICES
*no.     userclasses     timeslice             type        format  scenario year
   factor  filename
   1     1;3                  1-3                V           3         0
2024   1.00000  Projects\Highways\2024 DM Trips.txt
   2     1;3                  1-3                V           3         1
2024   1.00000  Projects\Highways\2024 RCO 01 Trips.txt
   3     1;3                  1-3                T           3         0
2024   0.01667  Projects\Highways\2024 DM Time.txt
   4     1;3                  1-3                T           3         1
2024   0.01667  Projects\Highways\2024 RCO 01 Time.txt
   5     1;3                  1-3                D           3         0
2024   1.00000  Projects\Highways\2024 DM Dist.txt
   6     1;3                  1-3                D           3         1
2024   1.00000  Projects\Highways\2024 RCO 01 Dist.txt
   7     1;3                  1-3                c3          3         0
2024   1.00000  Projects\Highways\2024 DM Toll.txt
   8     1;3                  1-3                C3          3         1
2024   1.00000  Projects\Highways\2024 RCO 01 Toll.txt
   9     1;3                  1-3                V           3         0
2039   1.00000  Projects\Highways\2039 DM Trips.txt
  10     1;3                  1-3                V           3         1
2039   1.00000  Projects\Highways\2039 RCO 01 Trips.txt
  11     1;3                  1-3                T           3         0
2039   0.01667  Projects\Highways\2039 DM Time.txt
  12     1;3                  1-3                T           3         1
2039   0.01667  Projects\Highways\2039 RCO 01 Time.txt
  13     1;3                  1-3                D           3         0
2039   1.00000  Projects\Highways\2039 DM Dist.txt
  14     1;3                  1-3                D           3         1
2039   1.00000  Projects\Highways\2039 RCO 01 Dist.txt
  15     1;3                  1-3                c3          3         0
2039   1.00000  Projects\Highways\2039 DM Toll.txt
  16     1;3                  1-3                C3          3         1
2039   1.00000  Projects\Highways\2039 RCO 01 Toll.txt
  17     1;3                  1-3                V           3         0
2054   1.00000  Projects\Highways\2054 DM Trips.txt
  18     1;3                  1-3                V           3         1
2054   1.00000  Projects\Highways\2054 RCO 01 Trips.txt
  19     1;3                  1-3                T           3         0
2054   0.01667  Projects\Highways\2054 DM Time.txt
  20     1;3                  1-3                T           3         1
2054   0.01667  Projects\Highways\2054 RCO 01 Time.txt
  21     1;3                  1-3                D           3         0
2054   1.00000  Projects\Highways\2054 DM Dist.txt
  22     1;3                  1-3                D           3         1
```

```
2054   1.00000  Projects\Highways\2054 RCO 01 Dist.txt
  23     1;3                  1-3                  c3          3         0
2054   1.00000  Projects\Highways\2054 DM Toll.txt
  24     1;3                  1-3                  C3          3         1
2054   1.00000  Projects\Highways\2054 RCO 01 Toll.txt


SECTORS
*mode   Sector_file_name
```

TUBA 1.9 ECONOMIC PARAMETERS FILE

PARAMETERS

TUBA_version	1.9	the current version of TUBA
base_year	2011	defines base year for economic parameters
pres_val_year	2011	present value year for discounting
RPI_base	100.0	value of RPI in base year
av_ind_tax	18.3	% average final indirect tax rate
NT_CARBONVALUES	5.66 5.66 5.66	base year carbon values in €/tonne (low high central) 2011 values based on CAF

MODES

*no.	description
1	Road
2	Bus
3	Rail

VEHICLE_TYPE/SUBMODE

*no.	mode	new_mode	P&R	type	description
1	1	N	N	per	Car
2	1	N	N	per	LGV
3	1	N	N	fre	OGV1
4	1	N	N	fre	OGV2
5	2	N	N	per	Bus
6	3	N	N	per	Light Rail
7	3	N	N	per	Heavy Rail

PERSON_TYPE

*no.	type(D/P)	description
1	D	Driver
2	P	Passenger

PURPOSE

*no.	type(B/C)	description
1	B	Business
2	C	Commuting
3	O	Other

FUEL_TYPE

*no.	sector	name (sector: 1=untraded sector 2=traded sector)
1	1	petrol
2	1	diesel

TIME_PERIODS

*no.	description	comments
1	AM Peak	(8-9)
2	Inter Peak	(Avg 12-14)
3	PM Peak	(17-18)

BREAKPOINTS

*description	breakpoint1	breakpoint2	..		
Distance	1.0	5.0	10.0	15.0	20.0
50.0	100.0				
TimeSaving	-5.0	-2.0	0.0	2.0	5.0

CHARGES

*no.	sector	description
1	pri	PT fares (private operators)
2	loc	PT fares (LA operated)
3	loc	LA tolls
4	cen	National tolls
5	pri	Private tolls
6	loc	LA on-street parking
7	loc	LA off-street parking
8	pri	Private parking

DISCOUNT_RATE

```
*% change p.a.
*Start_yr     End_yr     Rate
   1            100      5.00

VALUE_OF_TIME
*cents per hour(Perceived Costs)
*Vtype/submode Person_type VOT_purpose1 VOT_purpose2 VOT_purpose3 ..
   1             1           2902.0       1403.0       1275.0
   1             2           2902.0       1403.0       1275.0
   2             1           2902.0       1403.0       1275.0
   2             2           2902.0       1403.0       1275.0
   3             1           2902.0          0.0          0.0
   3             2           2902.0          0.0          0.0
   4             1           2902.0          0.0          0.0
   4             2           2902.0          0.0          0.0
   5             1           2902.0          0.0          0.0
   5             2           2902.0       1403.0       1275.0
   6             1           2902.0          0.0          0.0
   6             2           2902.0       1403.0       1275.0
   7             1           2902.0          0.0          0.0
   7             2           2902.0       1403.0       1275.0

VALUE_OF_TIME_GROWTH
*% change p.a. based on GNP growth in CAF
*Start_yr     End_yr     VOT_Gr_purpose1 VOT_Gr_purpose2 VOT_Gr_purpose3 ..
2012          2014            1.40         1.40         1.40
2015          2019            3.60         3.60         3.60
2020          2024            2.20         2.20         2.20
2025          2100            2.30         2.30         2.30

AV_IND_TAX_CHANGES
*% change p.a.
*Start_yr     End_yr     Growth
2012           2080       0.00

CHARGE_TAX_RATES
*
*charge       final     intermediate
  1            0.0           0.0
  2            0.0           0.0
  3            0.0           0.0
  4            0.0           0.0
  5            0.0           0.0
  6            0.0           0.0
  7            0.0           0.0

CHARGE_TAX_RATES_CHANGES
*% change p.a.
*Start_yr     End_yr     charge       final     intermediate
2012           2080        1           0.0           0.0
2012           2080        2           0.0           0.0
2012           2080        3           0.0           0.0
2012           2080        4           0.0           0.0
2012           2080        5           0.0           0.0
2012           2080        6           0.0           0.0
2012           2080        7           0.0           0.0

FUEL_COST
*type   resource(c/lit)  duty(c/lit)        VAT(%) carbon_grammes/litre
  1          63.00          57.62         21.0          627.57
  2          70.00          46.57         21.0          717.15

FUEL_COST_CHANGES
*% change p.a.
*Start_yr     End_yr     fuel_type    resource        duty            VAT
Carb_Den_change
2012           2012        1          10.70           0.00           2.00
   0.00
2012           2012        2           3.90           0.00           0.00
```

```
   0.00
2013            2013        1          -5.70           0.00           0.00
   0.00
2013            2013        2          -5.20           0.00           0.00
   0.00
2014            2014        1           0.00           0.00           0.00
   0.00
2014            2014        2          -3.30           0.00           0.00
   0.00
2015            2015        1         -30.60           2.00           0.00
   0.00
2015            2015        2         -32.60           2.90           0.00
   0.00
2016            2080        1           0.00           0.00           0.00
   0.00
2016            2080        2           0.00           0.00           0.00
   0.00


CARBON_VALUE_CHANGES
*relative (%p.a.) or absolute (€p.a.) growth; either absolute or relative may be
defined, not both
*same growth applies to low, central and high carbon values
*Start_yr     End_yr     Rel.(%)    Abs.(€/tonne/year)
2012            2012     2.00
2013            2013     0.00
2014            2014     0.00
2015            2015     4.00
2016            2016     5.00
2017            2017     5.00
2018            2019     0.00
2020            2020   137.00
2025            2025   140.00
2030            2030   250.00
2035            2035   163.00
2040            2040   137.00
2045            2045   115.00
2050            2050   111.00

FLEET
*2011 Split
*veh_type   %petrol       %diesel
  1           69.9           30.1
  2            0.3           99.7
  3            0.0          100.0
  4            0.0          100.0
  5            0.0          100.0
  6            0.0          100.0
  7            0.0          100.0

FLEET_CHANGES
*% p.a.
*Start_yr     End_yr    veh_type  %change_petrol
2012            2015        1          -2.539
2016            2020        1           0.478
2021            2025        1          -0.653
2026            2030        1          -0.868
2012            2015        2          -8.333
2016            2020        2         -20.000
2021            2025        2           0.000
2026            2030        2           0.000

FUEL_CONSUMPTION
*defined in litre/km
*veh_type   fuel_type    a_fuel      b_fuel        c_fuel        d_fuel
cut-off_speed(km/h)
  1             1         0.1605    -0.00269  0.182333E-04  0.000000E+00     140
  1             2         0.1605    -0.00269  0.182333E-04  0.000000E+00     140
  2             1         0.2177    -0.00352  0.282586E-04  0.000000E+00     140
```

2	2	0.2177	-0.00352	0.282586E-04	0.000000E+00	140
3	1	0.4448	-0.00718	0.521836E-04	0.000000E+00	96
3	2	0.4448	-0.00718	0.521836E-04	0.000000E+00	96
4	2	0.9029	-0.01401	0.955405E-04	0.000000E+00	96
5	2	0.7247	-0.01136	0.716045E-04	0.000000E+00	96
6	2	0.7247	-0.01136	0.716045E-04	0.000000E+00	96
7	2	0.7247	-0.01136	0.716045E-04	0.000000E+00	96

FUEL_EFFICIENCY

*% p.a.

*Start_yr	End_yr	veh_type	fuel_type	change
2012	2012	1	1	0.46
2012	2012	1	2	-0.09
2013	2013	1	1	0.42
2013	2013	1	2	-0.07
2014	2020	1	1	-2.48
2014	2020	1	2	-2.92
2021	2025	1	1	-2.37
2021	2025	1	2	-1.62
2026	2030	1	1	-0.92
2026	2030	1	2	-0.77
2012	2012	2	2	-0.20
2013	2013	2	2	-0.18
2014	2020	2	2	-3.25
2021	2025	2	2	-0.67
2026	2030	2	2	-0.27
2012	2012	3	2	-0.43
2013	2013	3	2	-0.38
2014	2020	3	2	1.67
2021	2025	3	2	-0.07
2026	2030	3	2	-0.01
2012	2012	4	2	-0.43
2013	2013	4	2	-0.38
2014	2020	4	2	1.67
2021	2025	4	2	-0.07
2026	2030	4	2	-0.01
2012	2012	5	2	-0.32
2013	2013	5	2	-0.34
2014	2020	5	2	0.64
2021	2025	5	2	-0.03
2026	2030	5	2	0.02
2012	2012	6	2	0.00
2013	2013	6	2	0.00
2014	2020	6	2	0.00
2021	2025	6	2	0.00
2026	2030	6	2	0.00
2012	2012	7	2	0.00
2013	2013	7	2	0.00
2014	2020	7	2	0.00
2021	2025	7	2	0.00
2026	2030	7	2	0.00

NON_FUEL_VOC

*veh_type	a_nonfuel_wrk	b_nonfuel_wrk	a_nonfuel_nw	b_nonfuel_nw	
1	1	6.265	171.493	5.507	0.000
1	2	6.265	171.493	5.507	0.000
2	1	9.099	70.308	10.327	0.000
3	1	10.020	393.702	0.000	0.000
3	2	10.020	393.702	0.000	0.000
4	2	19.491	758.888	0.000	0.000
5	2	45.458	1036.494	0.000	0.000
6	2	0.000	0.000	0.000	0.000
7	2	0.000	0.000	0.000	0.000

NON_FUEL_VOC_CHANGES

*% p.a.

*Start_yr	End_yr	veh_type	gnf
2012	2080	1	0.000
2012	2080	2	0.000

2012	2080	3	0.000
2012	2080	4	0.000
2012	2080	5	0.000

NON_FUEL_TAX_RATES

*%

*submode	final	intermediate
1	21.0	0.0
2	21.0	0.0
3	21.0	0.0
4	21.0	0.0
5	21.0	0.0
6	21.0	0.0
7	21.0	0.0

NON_FUEL_TAX_RATES_CHANGES

*% change p.a.

*Sub-Mode 1 values weighted based on petrol/diesel car fleet split (77.6%/22.4%)

*Start_yr	End_yr	Submode	final	intermediate
2012	2012	1	5.7	7.9
2013	2080	1	0.0	0.0
2012	2012	2	7.9	10.3
2013	2080	2	0.0	0.0
2012	2012	3	7.9	10.3
2013	2080	3	0.0	0.0
2012	2012	4	7.9	10.3
2013	2080	4	0.0	0.0
2012	2012	5	7.9	10.3
2013	2080	5	0.0	0.0
2012	2012	6	7.9	10.3
2013	2080	6	0.0	0.0
2012	2012	7	0.0	0.0
2013	2080	7	0.0	0.0

DEFAULT_PURPOSE_SPLIT

*Vtype/submode	purpose	Period1	Period2	Period2
1	1	13.3	16.9	12
1	2	44.2	36.7	42.9
1	3	42.5	46.4	45.1
2	1	41.3	50.3	40.2
2	2	45.2	35.1	45.1
2	3	13.5	14.6	14.7
3	1	76.7	81.4	75.6
3	2	16.1	11.1	17
3	3	7.2	7.5	7.4
4	1	82.5	86.9	79.7
4	2	11.7	7.8	13.2
4	3	5.8	5.3	7.1
5	1	10.2	10.2	10.2
5	2	18.9	18.9	18.9
5	3	70.8	70.8	70.9
6	1	10.2	10.2	10.2
6	2	18.9	18.9	18.9
6	3	70.8	70.8	70.9
7	1	10.2	10.2	10.2
7	2	18.9	18.9	18.9
7	3	70.8	70.8	70.9

DEFAULT_PERSON_FACTORS

*Vtype/submode	purpose	person_type	FactorPer1	FactorPer2	FactorPer3
1	1	1	1	1	1
1	1	2	0.26	0.25	0.26
1	2	1	1	1	1
1	2	2	0.23	0.22	0.23

```
  1               3          1                  1                  1
1
  1               3          2               0.66               0.65
0.68
  2               1          1                  1                  1
1
  2               1          2               0.37               0.32
0.38
  2               2          1                  1                  1
1
  2               2          2                0.4               0.41                0.4
  2               3          1                  1                  1
1
  2               3          2               0.49               0.45
0.48
  3               1          1                  1                  1
1
  3               1          2               0.09               0.09
0.09
  3               2          1                  1                  1
1
  3               2          2               0.24               0.28
0.24
  3               3          1                  1                  1
1
  3               3          2               0.26               0.33
0.27
  4               1          1                  1                  1
1
  4               1          2               0.03               0.03
0.03
  4               2          1                  1                  1
1
  4               2          2               0.11               0.14
0.08
  4               3          1                  1                  1
1
  4               3          2               0.11               0.12
0.16
  5               1          1                  1                  1
1
  5               1          2               0.35               0.35
0.35
  5               2          1                  1                  1
1
  5               2          2                1.5                1.5                1.5
  5               3          1                  1                  1
1
  5               3          2               8.35               8.35
8.35


DEFAULT_PERSON_FACTORS_CHANGE
*% change p.a.
*Start_yr   End_yr   Submode Purpose Person_type ChangePer1 ChangePer2
ChangePer3 ChangePer4 ChangePer5
2011        2080           1         1         2       0.00       0.00
0.00
2011        2080           1         2         2       0.00       0.00
0.00

PREPARATION&SUPERVISION
* total preparation (by stage) and supervision costs as % of land and
construction costs
*Mode   *Prep:SI    Prep:PC     Prep:PR      Prep:OP      Prep: WC     Super
  1        12.0         9.0         9.0         6.0         2.0         5.0
  2        12.0         9.0         9.0         6.0         2.0         5.0
```

COBALT Input File

General Scheme Section

Scheme Name

Sample Project

Years Subsection

Current Year 2016

Base Year 2014

Without-Scheme

Year 1 2020

Year 2 2035

Year 3 2050

Year 4

Year 5

With-Scheme

Year 1 2020

Year 2 2035

Year 3 2050

Year 4

Year 5

Scheme Opening Year 2020

Link and Junction Combined Input Section

Combined Classification Subsection

Link Name	Road Type	Length (km)	Speed Limit (km/h)
1	2	1.117	80
2	2	0.876	80
3	2	0.204	80
4	2	0.268	80
5	2	0.175	80
6	1	0.249	120
7	1	1.349	120
8	1	0.049	120
9	1	1.511	120
10	1	4.131	120

Combined Flow Subsection

Link		Base Year		Without-Scheme Flows			With-Scheme Flows		
Name	Flows	Year 1	Year 2	Year 3	Year 4	Year 5	Year 1	Year 2	Year 3
Year 4	Year 5								
1	1000	1100	1400	1700			100	100	100
2	2500	2600	2900	3100			100	100	100
3	3200	3300	3700	4600			100	100	100
4	3600	3700	4100	4800			100	100	100
5	2000	2100	2300	2500			100	100	100
6	0.00	0.00	0.00	0.00			1000	1300	1600
7	0.00	0.00	0.00	0.00			2500	2800	3000
8	0.00	0.00	0.00	0.00			3200	3600	4500
9	0.00	0.00	0.00	0.00			3600	4000	4700
10	0.00	0.00	0.00	0.00			2000	2200	2400

Combined Local Collision Rate Subsection

Link	Observed Accidents	First	Observed Local Severity	Split
Name		Accident Year	Ratio	Year

COBALT Parameter File
Version 2015.01

Cost Base Year
2011

Appraisal Period
30

Discount Rate

Years from Current Year	Discount Rate (%)
30	5
60	5

Cost per Casualty (€)

Severity	Cost
Fatal	2,310,500
Serious	331,400
Slight	31,100

Cost per Collision (€)

Severity	Insurance Administration	Damage to Property Urban	Rural	Motorway
Fatal	375	13,952	13,952	13,952
Serious	233	6,225	6,225	6,225
Slight	142	3,713	3,713	3,713
Damage	67	2,346	2,346	2,346

	Gardai Cost Urban	Rural	Motorway
Fatal	21,521	21,521	21,521
Serious	2,519	2,519	2,519
Slight	653	653	653
Damage	42	42	42

Compound Annual Rates of Growth of Collision Values

Range of Years	Rate of Growth (%p.a.)
2011-2015	1.04
2015-2020	1.036
2020-2025	1.022
2025+	1.023

Number of Damage Only Collisions per PIA

	Urban	Rural	Motorway
Damage	0.0	0.0	0.0

Link and Junction Combined Collision Proportions
Base Year
2011

Road Type	Speed Limit (km/h)	Collision Proportions Fatal	Serious	Slight	Road Description
1	>60	0.013	0.027	0.960	Motorway
2	>60	0.023	0.053	0.925	2 Lane Single Carriageway over 60 km/h
3	50/60	0.005	0.032	0.963	2 Lane Single Carriageway up to 60 km/h
4	>60	0.012	0.026	0.962	Dual Carriageway over 60 km/h
5	50/60	0.008	0.028	0.963	Dual Carriageway up to 60 km/h
6	>60	0.023	0.053	0.925	2+1 without Central Reserve Barrier over 60 km/h
7	50/60	0.005	0.032	0.963	2+1 without Central Reserve Barrier up to 60 km/h
8	>60	0.012	0.026	0.962	2+1 with Central Reserve Barrier over 60 km/h
9	50/60	0.008	0.028	0.963	2+1 with Central Reserve Barrier up to 60 km/h

10	30-60	0.005	0.032	0.963	1 Way up to 60 km/h
11	50/60	0.000	0.000	0.000	Vacant 1
12	50/60	0.000	0.000	0.000	Vacant 2
13	50/60	0.000	0.000	0.000	Vacant 3
14	50/60	0.000	0.000	0.000	Vacant 4
15	50/60	0.000	0.000	0.000	Vacant 5

Link and Junction Combined Collision Rates and Change Factors
Base Year
2011

Road Type	Speed Limit (km/h)	Collision Rate	Beta Factor	Road Description
1	>60	0.057	0.956	Motorway
2	>60	0.219	0.955	2 Lane Single Carriageway over 60 km/h
3	50/60	0.613	0.959	2 Lane Single Carriageway up to 60 km/h
4	>60	0.094	0.956	Dual Carriageway over 60 km/h
5	50/60	0.402	0.967	Dual Carriageway up to 60 km/h
6	>60	0.219	0.955	2+1 without Central Reserve Barrier over 60 km/h
7	50/60	0.613	0.959	2+1 without Central Reserve Barrier up to 60 km/h
8	>60	0.094	0.955	2+1 with Central Reserve Barrier over 60 km/h
9	50/60	0.402	0.959	2+1 with Central Reserve Barrier up to 60 km/h
10	30-60	0.449	0.959	1 Way up to 60 km/h
11	50/60	0	0	Vacant 1
12	50/60	0	0	Vacant 2
13	50/60	0	0	Vacant 3
14	50/60	0	0	Vacant 4
15	50/60	0	0	Vacant 5

Link Only and Link and Junction Combined Collision Beta Factor Changes over Time

Range of Years	Change to Beta Factor
2011-2016	1
2017-2026	0.5
2027-2036	0.25
2037+	0

Link and Junction Combined Casualty Rates
Base Year
2011

Road Type	Speed Limit (km/h)	Casualties per P.I.A. Fatal	Serious	Slight	Road Description
1	>60	0.025	0.033	1.393	
2	>60	0.050	0.106	1.451	
3	50/60	0.007	0.051	1.325	
4	>60	0.018	0.043	1.342	
5	50/60	0.008	0.045	1.233	
6	>60	0.050	0.106	1.451	
7	50/60	0.007	0.051	1.325	
8	>60	0.018	0.043	1.342	
9	50/60	0.008	0.045	1.233	
10	30-60	0.007	0.051	1.325	
11	50/60	0	0	0	Vacant 1
12	50/60	0	0	0	Vacant 2
13	50/60	0	0	0	Vacant 3
14	50/60	0	0	0	Vacant 4
15	50/60	0	0	0	Vacant 5

Link and Junction Combined Casualty Change Factors
Base Year
2011

Road Type	Speed Limit	Beta Factor	Road Description

	(km/h)	Fatal	Serious	Slight	
1	>60	0.978	0.979	1.002	Motorway
2	>60	0.979	0.983	1.002	2 Lane Single Carriageway over 60 km/h
3	50/60	0.971	0.995	1.001	2 Lane Single Carriageway up to 60 km/h
4	>60	0.984	0.985	0.998	Dual Carriageway over 60 km/h
5	50/60	0.998	0.990	1.002	Dual Carriageway up to 60 km/h
6	>60	0.979	0.983	1.002	2+1 without Central Reserve Barrier over 60 km/h
7	50/60	0.971	0.995	1.001	2+1 without Central Reserve Barrier up to 60 km/h
8	>60	0.979	0.983	1.002	2+1 with Central Reserve Barrier over 60 km/h
9	50/60	0.971	0.995	1.001	2+1 with Central Reserve Barrier up to 60 km/h
10	30-60	0.971	0.995	1.001	1 Way up to 60 km/h
11	50/60	0	0	0	Vacant 1
12	50/60	0	0	0	Vacant 2
13	50/60	0	0	0	Vacant 3
14	50/60	0	0	0	Vacant 4
15	50/60	0	0	0	Vacant 5

Link Only and Link and Junction Combined Casualty Beta Factor Changes over Time

Range of Years	Change to Beta Factor
2011-2016	1
2017-2026	0.5
2027-2036	0.25
2037+	0

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