

Draft Transport Strategy for the Greater Dublin Area

Outline Transport User Benefits Assessment

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1 Introduction

1.1 Overview

This report sets out an assessment of estimated transport user benefits for the Draft Greater Dublin Area Transport Strategy (2015-2035). This provides a high level indication of whether the proposed investment required for the Strategy is worthwhile.

This assessment has taken account of relevant guidance of the Department of Public Expenditure and Reform and the Department for Transport, Tourism and Sport.

1.2 Transport Strategy Assessment

The purpose of this assessment is to provide an initial high level indication of the performance of the package of strategy infrastructure schemes, i.e. do the benefits of implementing the Strategy exceed the costs. It is undertaken at a level of detail that is appropriate for this stage of transport strategy development, i.e.

- Cost estimates for the proposals are developed based on cost outturns for similar projects rather than detailed design; and
- Benefits are forecast based on outputs from the transport modelling assessment of the proposals which use broad assumptions regarding scheme operation and design.

It does not consider other recognised economic impacts arising from major transport schemes such as:

- Safety impacts associated with reductions in road collisions;
- Health, absenteeism and journey ambience impacts associated with changes in walking and cycling travel; and
- Wider economic impacts.

The inclusion of the above would provide additional benefits to those forecast in this report. At the scheme development stage, full detailed economic appraisal including cost benefit analyses and business cases will be prepared for the individual transport infrastructure investment proposals.

1.2.1 Transport User Benefits

The TUBA (v1.9.4) program has been used to estimate transport user benefits arising from the strategy. The assessment compares the “Do-Minimum” scenario (i.e. not to progress with the strategy) with a “Do-Something” scenario (i.e. the strategy) and estimates the benefits resulting from the strategy in terms of:

- Transport user time impacts;
- Vehicle operating cost impacts;
- Transport provider revenue impacts; and
- Impacts related to emissions (greenhouse gases).

1.3 Scenario Description

Do Minimum Network

The ‘Do-Minimum’ network includes the 2012 base network plus all the schemes (public transport, cycling and road) that are already built, under construction or are committed in terms of planning

approval and allocation of funds. The list of schemes to be included was developed in coordination with the NTA, TII and Local Authorities in the GDA region.

Full details of the Do Minimum networks are outlined in the *Greater Dublin Area Draft Transport Strategy 2015 – 2035 Transport Modelling Report*. The major schemes include:

- Luas Cross City;
- Phoenix Park Tunnel; and
- Dublin City Centre Rail Re-signalling Project.

Do Strategy Network

The “Do Strategy” Scenario represents the full implementation of all transport infrastructure proposals included in the GDA Transport Strategy up to 2035.

Full details of the Do Strategy networks are outlined in the *Greater Dublin Area Draft Transport Strategy 2015 – 2035 Transport Modelling Report*. The major schemes include:

- Core Bus Network;
- Swords-City, Blanchardstown-UCD and Clongriffin-Tallaght Swiftway BRT lines;
- DART Expansion Programme;
- Optimised Metro North from the Fingal / North Dublin Transport Study;
- Dublin Orbital Movement Strategy proposal;
- Preferred Dublin Corridor Study public transport proposals;
- Dublin Metropolitan Area Road Proposals and
- Dublin City Centre Transport Plan

Further details of the Do Minimum and Do Strategy schemes are outlined in the ‘*Greater Dublin Area Draft Transport Strategy 2015 – 2035: Transport Modelling Report*’.

2 Inputs and Assumptions

2.1 Overview

This section summarises the key inputs into the transport user benefits assessment as follows:

- Inputs generated by a transport model;
- Standard economic parameters; and
- Cost Estimates.

These are outlined in further detail below.

2.2 Inputs from the Transport Models

In order to calculate the changes in travel costs as a result of the implementation of the strategy, travel demand and cost skims are extracted from the Do-Minimum and Do-Strategy transport model runs. The demand is split by purpose with common value of time and the travel costs are split into the appropriate sub-components as required in the guidance.

For the purposes of this assessment, it is assumed that all the schemes proposed as part of the Strategy start operating in 2035. Therefore only the benefits arising after 2035 year are included in the assessment. This means that the benefits of the strategy will be underestimated as many of the schemes are expected to start operating before 2035. This approach is different to that applied to the costs in Section 2.4.

2.3 Standard economic parameters

Standard transport appraisal parameters in Ireland are available from the following documents:

- Department of Public Expenditure and Reform '*Public Spending Code*', 2013;
- Department of Transport '*Guidelines on a Common Appraisal Framework for Transport Projects and Programmes*', 2009 - Appendix 1: Application Rules for Cost-Benefit Parameter Values; and
- NRA 2011 '*Project Appraisal Guidelines*', 2011 - Unit 6.11 National Parameters Values Sheet.

All general transport appraisal parameters are taken from the above documents. Updated vehicle purpose splits and vehicle occupancy rates were extracted from the Eastern Regional Model. Fuel efficiency data was taken from UK WebTAG guidance as no guidance is currently available in Ireland. Full details of the parameters used are contained within the TUBA Economic and Scheme files included in Appendix 1 and 2.

The other main input assumptions to the assessment are as follows:

- A price base year and present value year of 2009;
- A strategy opening year of 2035;
- A standard appraisal period of 30 years;
- A residual value period of a further 30 years;
- A discount rate of 5% as per the DPER '*Public Spending Code*';
- Shadow pricing has been included in line with the DPER '*Public Spending Code*', i.e. a shadow price of public funds of 130% and a shadow price of labour of 80%;
- All outputs are presented in market prices; and

- Annualisation factors have been developed from a detailed analysis of observed data and transport model outputs.

2.4 Cost Estimate

An outline cost estimate of the Strategy has been prepared based on estimates available to the NTA as of September 2015. The cost estimates have been provided in 2015 prices, exclusive of VAT. The profile of expenditure is based on an estimated programme of works to deliver the Strategy by 2035. Further details of the cost estimates and expenditure profiles are provided in Section 3.2 and Appendices 2 and 4.

3 Transport User Benefits Summary

3.1 Outline Transport User Benefits

The results of the assessment of transport user benefits for the proposed GDA Strategy are presented in Table 3.1.

Table 3.1 Transport User Benefit Summary – GDA Transport Strategy (2009 market prices)

	€ '000
Consumer User Benefits	9,446,500
Business User Benefits	3,005,300
Indirect Tax Revenues	-47,000
Emissions Benefits (Greenhouse Gases)	100
Present Value of Transport User Benefits	12,404,900

The GDA Strategy is forecast to generate approximately €12.4 billion in transport user benefits over a 60 year period.

3.2 Outline Strategy Cost Estimate

The outline cost estimates are high level estimates based on values from individual scheme development, broad per km rates, and other general assumptions for each strategy option. The estimates are provided for the purposes of this high level estimate of transport user benefits only and should not be used or relied upon for any other purposes. The sources used for the cost estimates are outlined in Appendix 4.

More reliable cost estimates will be undertaken at each scheme development stage for each individual scheme included in the strategy, as appropriate. The estimates of scheme capital costs are presented in Table 3.2, in 2015 prices and exclusive of VAT, i.e. at factor costs.

Table 3.2 Outline Capital Cost Estimates (2015 prices, factor costs)

Scheme	Capital Cost (€ m)
DART Expansion	3,360
LR7 Metro North	2,180
South East Metro	1,500
South West BRT	80
Western Luas	630
Finglas Luas	180
Inner Orbital Bus	100
Outer Orbital Bus	140
Swiftway Swords to City	240
Swiftway Blanchardstown to UCD	290
Swiftway Clongriffin to Rathfarnham	190
Core Bus Services	240
Road Schemes	680
Total	9,810

In addition to the capital costs of the schemes, an allowance was made for appropriate annual operation and maintenance (O&M) costs and an allowance for fleet and infrastructure renewal requirements over the assessment period.

Estimates were developed based on comparative costs of similar schemes and previous experience. The total annual operating cost estimate and fleet renewal cost estimate over the assessment period for the entire GDA Strategy is outlined in Table 3.3.

Table 3.3 Outline Total O&M and Renewal Cost Estimates for GDA Strategy (current prices, factor costs)

Estimate	Cost (€ m)
Annual O&M Cost	315
Total Fleet & Infrastructure Renewal Cost Estimate	2,160

Applying the principles of the guidance from DPER in relation to shadow pricing (at 130% for public funds and 80% for labour) and the discount rate of 5%, the total present value of costs (PVC) for the strategy is presented in Table 3.4.

Table 3.4 Present Value of Costs for GDA Strategy (2009 market prices)

Estimate	Cost (€ m)
Present Value of Strategy Costs	9,445

3.3 Comparison of Benefits to Costs for the Strategy

A simple assessment was undertaken to compare the estimated transport user benefits to the set of outline cost estimates available to the NTA as of September 2015.

Generally, if the forecast benefits for the Strategy exceed the estimated costs, then the investment can be considered worthwhile. The results of the assessment of the Strategy are presented in Table 3.5.

Table 3.5 Comparison of Benefits to Costs for the GDA Strategy (2009 market prices)

	€ '000
Present Value of Transport User Benefits	12,404,900
Present Value of Strategy Costs	9,445,100
Net Present Value	2,959,800
Transport User Benefit to Cost Ratio	1.3:1

The estimated transport user benefits of the GDA Strategy are forecast to exceed the estimated outline strategy costs with a benefit to cost ratio of 1.3:1. This indicates that investment in the GDA Strategy is worthwhile, based on transport user benefits alone.

Appendices

Appendix 1 TUBA Economic Input File

TUBA 1.9.4 ECONOMIC PARAMETERS FILE

PARAMETERS

TUBA_version	1.9.4	the current version of TUBA
base_year	2009	defines base year for economic parameters
pres_val_year	2009	present value year for discounting
GDP_base	102.2	value of RPI in base year
av_ind_tax	19.1	% average final indirect tax rate
nt_carbdxvalues	11.1 11.1 11.1	base year carbon values in €/tonne (low high central)

MODES

*no.	description
1	Highway
2	Public Transport

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	<u>fre</u>	OGV1
4	1	N	N	<u>fre</u>	OGV2
5	2	N	N	per	Bus
6	2	N	N	per	Light Rail
7	2	N	N	per	Heavy Rail

PERSON_TYPE

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

PURPOSE

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

FUEL_TYPE

*no.	sector	name	(sector: 1= <u>untraded</u> sector 2=traded sector)
1	1	petrol	
2	1	diesel	

TIME_PERIODS

*no.	description	comments
1	AM	0800-0900
2	IP	1200-1400 Average Peak <u>hr</u>
3	PM	1700-1800

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	<u>pri</u>	PT fares (private operators)
2	<u>loc</u>	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	30	5.00
31	90	5.00

VALUE_OF_TIME

*cents per hour(Percieved Costs), 2009 values and prices based on PAG

*Vtype/submode	Person_type	VOT_purpose1	VOT_purpose2	VOT_purpose3	..
1	1	2781.0	1308.0	1189.0	
1	2	2781.0	1308.0	1189.0	
2	1	2781.0	1308.0	1189.0	
2	2	2781.0	1308.0	1189.0	
3	1	2781.0	0.0	0.0	
3	2	2781.0	0.0	0.0	
4	1	2781.0	0.0	0.0	
4	2	2781.0	0.0	0.0	
5	1	2781.0	0.0	0.0	
5	2	2781.0	1308.0	1189.0	
6	1	2781.0	0.0	0.0	
6	2	2781.0	1308.0	1189.0	
7	1	2781.0	0.0	0.0	
7	2	2781.0	1308.0	1189.0	

VALUE_OF_TIME_GROWTH

*% change p.a. based on PAG

*Start_yr	End_yr	VOT_Gr_purpose1	VOT_Gr_purpose2	VOT_Gr_purpose3	..
2010	2010	0.00	-1.00	-1.00	
2011	2011	0.00	1.60	1.60	
2012	2020	2.50	2.00	2.00	
2021	2095	2.00	1.60	1.60	

AV_IND_TAX_CHANGES

*% change p.a.

*Start_yr	End_yr	Growth
2010	2095	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
8	0.0	0.0

CHARGE_TAX_RATES_CHANGES

*% change p.a.

*Start_yr	End_yr	charge	final	intermediate
2010	2095	1	0.0	0.0
2010	2095	2	0.0	0.0
2010	2095	3	0.0	0.0
2010	2095	4	0.0	0.0
2010	2095	5	0.0	0.0
2010	2095	6	0.0	0.0
2010	2095	7	0.0	0.0

FUEL_COST

*type resource(p/unit) duty(p/unit) VAT(%) carbon_grammes/unit (unit=litre for fuel types 1 & 2; unit=KWH for electric)

1	44.8	50.9	21.5	627.57
2	44.5	40.9	21.5	717.15

FUEL_COST_CHANGES

*% change p.a.

*Start_yr	End_yr	fuel_type	resource	duty	VAT	Carb_Den_change
2010	2010	1	1.00	6.50	-0.50	0.00
2010	2010	2	1.00	10.30	-0.50	0.00
2011	2011	1	1.00	0.00	0.00	0.00
2011	2011	2	1.00	0.00	0.00	0.00
2012	2012	1	1.00	0.00	2.00	0.00
2012	2012	2	1.00	0.00	2.00	0.00
2013	2030	1	1.00	0.00	0.00	0.00
2013	2030	2	1.00	0.00	0.00	0.00
2031	2095	1	0.00	0.00	0.00	0.00
2031	2095	2	0.00	0.00	0.00	0.00

CARBDX_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.(%) - non-traded Abs.- non-traded' (£/tonne/year) Rel.(%) -traded Abs.(£/tonne/year) - traded

2010	2010	5.000	0.000	0.000	0.000
2011	2011	5.000	0.000	0.000	0.000
2012	2012	7.000	0.000	0.000	0.000
2013	2013	8.000	0.000	0.000	0.000
2014	2014	7.000	0.000	0.000	0.000
2015	2015	117.000	0.000	0.000	0.000
2016	2095	5.000	0.000	0.000	0.000

FLEET

*veh_type	%petrol	%diesel
1	77.6	22.4
2	15.0	85.0
3	15.0	85.0
4	15.0	85.0
5	0	100.0
6	0	100.0
7	0	100.0

FLEET_CHANGES

*% p.a.

*Start_yr	End_yr	veh_type	%change_petrol
2010	2010	1	-2.40
2011	2025	1	-1.3
2026	2040	1	0.00

FUEL_CONSUMPTION

*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
5	2	4.1156	0.30646	-0.420643E-02	0.365263E-04	96

FUEL_EFFICIENCY

*% p.a.

*Start_yr	End_yr	veh_type	fuel_type	change
2010	2024	1	1	-2.00
2010	2024	1	2	-2.00
2025	2095	1	1	0.00
2025	2095	1	2	0.00
2010	2095	2	1	0.00
2010	2095	2	2	0.00
2010	2095	3	1	0.00
2010	2095	3	2	0.00
2010	2024	5	1	-2.00
2010	2024	5	2	-2.00

NON_FUEL_VOC

*veh_type	fuel_type	a_nonfuel_wrk	b_nonfuel_wrk	a_nonfuel_nw	b_nonfuel_nw
1	1	6.388	36.783	6.388	36.783
1	2	6.388	36.783	6.388	36.783
2	1	11.413	65.599	0.000	0.000
3	1	10.623	417.431	0.000	0.000
3	2	10.623	417.431	0.000	0.000
4	2	20.666	804.625	0.000	0.000
5	2	48.198	1098.877	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
2010	2095	1	0.000
2010	2095	2	0.000
2010	2095	3	0.000
2010	2095	4	0.000
2010	2095	5	0.000

NON_FUEL_TAX_RATES

*%

*submode	final	intermediate
1	21.5	0.0
2	21.5	0.0
3	21.5	0.0

NON_FUEL_TAX_RATES_CHANGES

*% change p.a.

*Start_yr	End_yr	Submode	final	intermediate
2010	2010	1	5.7	7.9
2011	2095	1	0.0	0.0
2010	2010	2	7.9	10.3
2011	2095	2	0.0	0.0
2010	2010	3	7.9	10.3
2011	2095	3	0.0	0.0
2010	2010	4	7.9	10.3
2011	2095	4	0.0	0.0
2010	2010	5	7.9	10.3
2011	2095	5	0.0	0.0
2010	2010	6	7.9	10.3
2011	2095	6	0.0	0.0
2010	2010	7	0.0	0.0
2011	2095	7	0.0	0.0

DEFAULT_PURPOSE_SPLIT

*Vtype/submode	purpose	Period1	Period2	Period3
1	1	4.1	7.5	4.2
1	2	44.4	18.1	43.3
1	3	51.5	74.4	52.5
2	1	40.2	40.2	40.2
2	2	45.1	45.1	45.1
2	3	14.7	14.7	14.7
3	1	100.0	100.0	100.0
3	2	0	0	0
3	3	0	0	0
4	1	100.0	100.0	100.0
4	2	0	0	0
4	3	0	0	0
5	1	4.1	10.3	4.7
5	2	38.8	12.3	41.9
5	3	57.1	77.4	53.4
6	1	10.2	10.2	10.2
6	2	18.9	18.9	18.9
6	3	70.8	70.8	70.8
7	1	10.2	10.2	10.2
7	2	18.9	18.9	18.9
7	3	70.8	70.8	70.8

DEFAULT_PERSON_FACTORS

*Vtype/submode	purpose	person_type	FactorPer1	FactorPer2	FactorPer3
1	1	1	1	1	
1					
1	1	2	0.18	0.09	
0.18					
1	2	1	1	1	1
1	2	2	0.10	0.05	
0.10					
1	3	1	1	1	
1					
1	3	2	0.53	0.31	0.52
2	1	1	1	1	1
2	1	2	0.38	0.38	0.38

2	2	1	1	1		
1						
2	2	2	0.40	0.40	0.40	
2	3	1	1	1	1	
2	3	2	0.48	0.48	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	0.24	0.24	
3	3	1	1	1	1	
3	3	2	0.27	0.27	0.27	
4	1	1	1	1	1	
4	1	2	0.03	0.03	0.03	
4	2	1	1	1	1	
1						
4	2	2	0.08	0.08	0.08	
4	3	1	1	1	1	
4	3	2	0.16	0.16	0.16	

DEFAULT_PERSON_FACTORS_CHANGE

*% change p.a.

*Start_yr	End_yr	Submode	Purpose	Person_type	ChangePer1	ChangePer2	ChangePer3	ChangePer4	ChangePer5
2009	2095	1	1	2	0.00	0.00			
2009	2095	1	2	2	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

Appendix 2 TUBA Scheme Input File

SPECIFIC PARAMETERS

* TUBA v1.9.4 Release May 2014

PARAMETERS

TUBA_version 1.9.4
run_name TUBA_RUN2
do_min_name Do Min
do_som_name Do Strat
first_yr 2035
horizon_yr 2094
modelled_yrs 2035 2065
detail Yes
current_yr 2015
print_warn 50
P&R_car_speed 65.0
zones_as_sectors Yes

TIME_SLICES

*no.	duration(min)	<u>annualisation</u>	period	description
1	60	616	1	0800-0900
2	60	3044	2	1000-1300
3	60	688	3	1600-1900

SCHEMES_DM

*Mode	1st Construction year	Opening_yr	Stage
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DO_MIN_COSTS

*Type	Mode	Funding	Cost	Price	GDP
-------	------	---------	------	-------	-----

DO_MIN_PROFILE

*Year	Mode	<u>%Const</u>	%Land	%Prep	%Super	<u>%Maint</u>	%Op	%Grant	<u>%Dev</u>
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DO_MIN_DELAY_COSTS

*Year	Mode	Business	Commuting	Other	Freight
-------	------	----------	-----------	-------	---------

SCHEMES_DS

*Mode	1st Construction year	Opening_yr	Stage
1	2024	2035	SI

DO_SOM_COSTS

*Type	Mode	Funding	Cost	Price	GDP
C	1	<u>cen</u>	13347009.6	F	102.2
M	1	<u>cen</u>	3850648.4	F	102.2
O	1	<u>cen</u>	28684977.2	F	102.2

DO_SOM_PROFILE

*Year	Mode	<u>%Const</u>	%Land	%Prep	%Super	<u>%Maint</u>	%Op	%Grant	<u>%Dev</u>
2015	1	0.2	0.0	0.0	0.0	0.0	0.0		
2016	1	0.4	0.0	0.0	0.0	0.0	0.0		
2017	1	0.5	0.0	0.0	0.0	0.0	0.0		
2018	1	1.0	0.0	0.0	0.0	0.0	0.0		
2019	1	1.7	0.0	0.0	0.0	0.0	0.0		
2020	1	3.1	0.0	0.0	0.0	0.0	0.0		
2021	1	2.1	0.0	0.0	0.0	0.0	0.0		

2022	1	1.4	0.0	0.0	0.0	0.0	0.0
2023	1	1.2	0.0	0.0	0.0	0.0	0.0
2024	1	1.6	0.0	0.0	0.0	0.0	0.0
2025	1	2.6	0.0	0.0	0.0	0.0	0.0
2026	1	5.6	0.0	0.0	0.0	0.0	0.0
2027	1	9.6	0.0	0.0	0.0	0.0	0.0
2028	1	11.2	0.0	0.0	0.0	0.0	0.0
2029	1	11.7	0.0	0.0	0.0	0.0	0.0
2030	1	9.9	0.0	0.0	0.0	0.0	0.0
2031	1	9.7	0.0	0.0	0.0	0.0	0.0
2032	1	9.6	0.0	0.0	0.0	0.0	0.0
2033	1	9.2	0.0	0.0	0.0	0.0	0.0
2034	1	6.4	0.0	0.0	0.0	0.0	0.0
2035	1	1.3	0.0	0.0	0.0	0.1	1.2
2036	1	0.0	0.0	0.0	0.0	0.1	1.2
2037	1	0.0	0.0	0.0	0.0	0.1	1.2
2038	1	0.0	0.0	0.0	0.0	0.1	1.3
2039	1	0.0	0.0	0.0	0.0	0.1	1.3
2040	1	0.0	0.0	0.0	0.0	0.1	1.3
2041	1	0.0	0.0	0.0	0.0	0.1	1.3
2042	1	0.0	0.0	0.0	0.0	0.1	1.3
2043	1	0.0	0.0	0.0	0.0	0.1	1.3
2044	1	0.0	0.0	0.0	0.0	5.3	1.3
2045	1	0.0	0.0	0.0	0.0	0.1	1.4
2046	1	0.0	0.0	0.0	0.0	0.1	1.4
2047	1	0.0	0.0	0.0	0.0	0.1	1.4
2048	1	0.0	0.0	0.0	0.0	0.1	1.4
2049	1	0.0	0.0	0.0	0.0	0.1	1.4
2050	1	0.0	0.0	0.0	0.0	0.1	1.4
2051	1	0.0	0.0	0.0	0.0	0.1	1.4
2052	1	0.0	0.0	0.0	0.0	0.1	1.5
2053	1	0.0	0.0	0.0	0.0	0.1	1.5
2054	1	0.0	0.0	0.0	0.0	19.2	1.5
2055	1	0.0	0.0	0.0	0.0	0.2	1.5
2056	1	0.0	0.0	0.0	0.0	0.2	1.5
2057	1	0.0	0.0	0.0	0.0	0.2	1.5
2058	1	0.0	0.0	0.0	0.0	0.2	1.5
2059	1	0.0	0.0	0.0	0.0	0.2	1.6
2060	1	0.0	0.0	0.0	0.0	0.2	1.6
2061	1	0.0	0.0	0.0	0.0	0.2	1.6
2062	1	0.0	0.0	0.0	0.0	0.2	1.6
2063	1	0.0	0.0	0.0	0.0	0.2	1.6
2064	1	0.0	0.0	0.0	0.0	6.5	1.6
2065	1	0.0	0.0	0.0	0.0	0.2	1.7
2066	1	0.0	0.0	0.0	0.0	0.2	1.7
2067	1	0.0	0.0	0.0	0.0	0.2	1.7
2068	1	0.0	0.0	0.0	0.0	0.2	1.7
2069	1	0.0	0.0	0.0	0.0	0.2	1.7
2070	1	0.0	0.0	0.0	0.0	0.2	1.7
2071	1	0.0	0.0	0.0	0.0	0.2	1.8
2072	1	0.0	0.0	0.0	0.0	0.2	1.8
2073	1	0.0	0.0	0.0	0.0	0.2	1.8
2074	1	0.0	0.0	0.0	0.0	23.5	1.8
2075	1	0.0	0.0	0.0	0.0	0.2	1.8
2076	1	0.0	0.0	0.0	0.0	0.2	1.8
2077	1	0.0	0.0	0.0	0.0	0.2	1.9
2078	1	0.0	0.0	0.0	0.0	0.2	1.9

2079	1	0.0	0.0	0.0	0.0	0.2	1.9
2080	1	0.0	0.0	0.0	0.0	0.2	1.9
2081	1	0.0	0.0	0.0	0.0	0.2	1.9
2082	1	0.0	0.0	0.0	0.0	0.2	2.0
2083	1	0.0	0.0	0.0	0.0	0.2	2.0
2084	1	0.0	0.0	0.0	0.0	7.9	2.0
2085	1	0.0	0.0	0.0	0.0	0.2	2.0
2086	1	0.0	0.0	0.0	0.0	0.2	2.0
2087	1	0.0	0.0	0.0	0.0	0.2	2.1
2088	1	0.0	0.0	0.0	0.0	0.2	2.1
2089	1	0.0	0.0	0.0	0.0	0.2	2.1
2090	1	0.0	0.0	0.0	0.0	0.2	2.1
2091	1	0.0	0.0	0.0	0.0	0.2	2.1
2092	1	0.0	0.0	0.0	0.0	0.2	2.1
2093	1	0.0	0.0	0.0	0.0	0.2	2.1
2094	1	0.0	0.0	0.0	0.0	28.6	2.2

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	5	0	2
2	1	0	0
3	3	0	0

INPUT_MATRICES

*no.	userclasses	timeslice	type	format	scenario	year	factor
1	2	1-3	V	3	1	2035	
1.00000	C:\GDA\TUBA\Runs\35\dostrat06\HW_Car_Demand.txt						
2	3	1-3	V	3	1	2035	
1.00000	C:\GDA\TUBA\Runs\35\dostrat06\HW_HGV_Demand.txt						
3	2	1-3	V	3	1	2065	
1.00000	C:\GDA\TUBA\Runs\65\dostrat06\HW_Car_Demand.txt						
4	3	1-3	V	3	1	2065	
1.00000	C:\GDA\TUBA\Runs\65\dostrat06\HW_HGV_Demand.txt						
5	2	1-3	V	3	0	2035	
1.00000	C:\GDA\TUBA\Runs\35\domin02\HW_Car_Demand.txt						
6	3	1-3	V	3	0	2035	
1.00000	C:\GDA\TUBA\Runs\35\domin02\HW_HGV_Demand.txt						
7	2	1-3	V	3	0	2065	
1.00000	C:\GDA\TUBA\Runs\65\domin02\HW_Car_Demand.txt						
8	3	1-3	V	3	0	2065	
1.00000	C:\GDA\TUBA\Runs\65\domin02\HW_HGV_Demand.txt						
9	2	1-3	D	3	1	2035	
1.00000	C:\GDA\TUBA\Runs\35\dostrat06\HW_Car_Dist.txt						
10	3	1-3	D	3	1	2035	
1.00000	C:\GDA\TUBA\Runs\35\dostrat06\HW_HGV_Dist.txt						
11	2	1-3	D	3	1	2065	
1.00000	C:\GDA\TUBA\Runs\65\dostrat06\HW_Car_Dist.txt						

12	3	1-3	D	3	1	2065
1.00000	C:\GDA\TUBA\Runs\65\dostrat06\HW_HGV_Dist.txt					
13	2	1-3	D	3	0	2035
1.00000	C:\GDA\TUBA\Runs\35\domin02\HW_Car_Dist.txt					
14	3	1-3	D	3	0	2035
1.00000	C:\GDA\TUBA\Runs\35\domin02\HW_HGV_Dist.txt					
15	2	1-3	D	3	0	2065
1.00000	C:\GDA\TUBA\Runs\65\domin02\HW_Car_Dist.txt					
16	3	1-3	D	3	0	2065
1.00000	C:\GDA\TUBA\Runs\65\domin02\HW_HGV_Dist.txt					
17	2	1-3	T	3	1	2035
1.00000	C:\GDA\TUBA\Runs\35\dostrat06\HW_Car_Time.txt					
18	3	1-3	T	3	1	2035
1.00000	C:\GDA\TUBA\Runs\35\dostrat06\HW_HGV_Time.txt					
19	2	1-3	T	3	1	2065
1.00000	C:\GDA\TUBA\Runs\65\dostrat06\HW_Car_Time.txt					
20	3	1-3	T	3	1	2065
1.00000	C:\GDA\TUBA\Runs\65\dostrat06\HW_HGV_Time.txt					
21	2	1-3	T	3	0	2035
1.00000	C:\GDA\TUBA\Runs\35\domin02\HW_Car_Time.txt					
22	3	1-3	T	3	0	2035
1.00000	C:\GDA\TUBA\Runs\35\domin02\HW_HGV_Time.txt					
23	2	1-3	T	3	0	2065
1.00000	C:\GDA\TUBA\Runs\65\domin02\HW_Car_Time.txt					
24	3	1-3	T	3	0	2065
1.00000	C:\GDA\TUBA\Runs\65\domin02\HW_HGV_Time.txt					
25	2	1-3	C4	3	1	2035
1.00000	C:\GDA\TUBA\Runs\35\dostrat06\HW_Car_Toll.txt					
26	3	1-3	C4	3	1	2035
1.00000	C:\GDA\TUBA\Runs\35\dostrat06\HW_HGV_Toll.txt					
27	2	1-3	C4	3	1	2065
1.00000	C:\GDA\TUBA\Runs\65\dostrat06\HW_Car_Toll.txt					
28	3	1-3	C4	3	1	2065
1.00000	C:\GDA\TUBA\Runs\65\dostrat06\HW_HGV_Toll.txt					
29	2	1-3	C4	3	0	2035
1.00000	C:\GDA\TUBA\Runs\35\domin02\HW_Car_Toll.txt					
30	3	1-3	C4	3	0	2035
1.00000	C:\GDA\TUBA\Runs\35\domin02\HW_HGV_Toll.txt					
31	2	1-3	C4	3	0	2065
1.00000	C:\GDA\TUBA\Runs\65\domin02\HW_Car_Toll.txt					
32	3	1-3	C4	3	0	2065
1.00000	C:\GDA\TUBA\Runs\65\domin02\HW_HGV_Toll.txt					
33	1	1-3	P	3	1	2035
1.00000	C:\GDA\TUBA\Runs\35\dostrat06\PT_Demand.txt					
34	1	1-3	P	3	1	2065
1.00000	C:\GDA\TUBA\Runs\65\dostrat06\PT_Demand.txt					
35	1	1-3	P	3	0	2035
1.00000	C:\GDA\TUBA\Runs\35\domin02\PT_Demand.txt					
36	1	1-3	P	3	0	2065
1.00000	C:\GDA\TUBA\Runs\65\domin02\PT_Demand.txt					
37	1	1-3	D	3	1	2035
1.00000	C:\GDA\TUBA\Runs\35\dostrat06\PT_Dist.txt					
38	1	1-3	D	3	1	2065
1.00000	C:\GDA\TUBA\Runs\65\dostrat06\PT_Dist.txt					
39	1	1-3	D	3	0	2035
1.00000	C:\GDA\TUBA\Runs\35\domin02\PT_Dist.txt					
40	1	1-3	D	3	0	2065

1.00000	C:\GDA\TUBA\Runs\65\domin02\PT_Dist.txt					
41	1	1-3	C1	3	1	2035
1.00000	C:\GDA\TUBA\Runs\35\dostrat06\PT_Fare.txt					
42	1	1-3	C1	3	1	2065
1.00000	C:\GDA\TUBA\Runs\65\dostrat06\PT_Fare.txt					
43	1	1-3	C1	3	0	2035
1.00000	C:\GDA\TUBA\Runs\35\domin02\PT_Fare.txt					
44	1	1-3	C1	3	0	2065
1.00000	C:\GDA\TUBA\Runs\65\domin02\PT_Fare.txt					
45	1	1-3	T	3	1	2035
1.00000	C:\GDA\TUBA\Runs\35\dostrat06\PT_Time.txt					
46	1	1-3	T	3	1	2065
1.00000	C:\GDA\TUBA\Runs\65\dostrat06\PT_Time.txt					
47	1	1-3	T	3	0	2035
1.00000	C:\GDA\TUBA\Runs\35\domin02\PT_Time.txt					
48	1	1-3	T	3	0	2065
1.00000	C:\GDA\TUBA\Runs\65\domin02\PT_Time.txt					

SECTORS

*mode Sector_file_name

- 1 C:\GDA\TUBA\Parameters\TUBA_sectors4.csv
- 2 C:\GDA\TUBA\Parameters\TUBA_sectors4.csv

Appendix 3 TUBA Output File Summary

Economy: Economic Efficiency of the Transport System(TEE)

Consumer - Commuting user benefits		All Modes
Highway	Public	
Travel Time		2800728
18394	2782335	
Vehicle operating costs		59077
59077	0	
User charges		102806
-5973	108778	
During Construction & Maintenance		0
0	0	
NET CONSUMER - COMMUTING BENEFITS		2962611
71498	2891113	

Consumer - Other user benefits		All Modes
Highway	Public	
Travel Time		6079605
263709	5815896	
Vehicle operating costs		144300
144300	0	
User charges		260002
-9650	269652	
During Construction & Maintenance		0
0	0	
NET CONSUMER - OTHER BENEFITS		6483907
398359	6085548	

Business		All Modes	Road Personal	Road Freight	Bus
Personal	Bus Freight				
Travel Time		2526090	82183	359841	
2084066	0				
Vehicle operating costs		36203	988	35215	
0	0				
User charges		210095	-1004	175729	
35370	0				
During Construction & Maintenance		0	0	0	
0	0				
Subtotal		2772388	82167	570785	
2119436	0				

Private Sector Provider Impacts		
Revenue		232899
0	232899	
Operating costs		0
0	0	
Investment costs		0
0	0	
Grant/subsidy		0
0	0	
Subtotal		232899
0	232899	

Other business Impacts		
Developer contributions		0
0	0	
NET BUSINESS IMPACT		3005287

TOTAL
 Present Value of Transport Economic
 Efficiency Benefits (TEE) 12451805

Note: Benefits appear as positive numbers, while costs appear as negative numbers.
 Note: All entries are present values discounted to 2009, in 2009 prices

Public Accounts

Local Government Funding	ALL MODES	Highway	Public
Revenue	0	0	0
Operating Costs	0	0	0
Investment Costs	0	0	0
Developer Contributions	0	0	0
Grant/Subsidy Payments	0	0	0
NET IMPACT	0	0	0

Central Government Funding: Transport	ALL MODES	Highway	Public
Revenue	168157	168157	0
Operating costs	3056965	3056965	0
Investment costs	6219990	6219990	0
Developer Contributions	0	0	0
Grant/Subsidy Payments	0	0	0
NET IMPACT	9445112	9445112	0

Central Government Funding: Non-Transport

Indirect Tax Revenues	46951	12189	34762
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TOTALS			
Broad Transport Budget	9445112	9445112	0
Wider Public Finances	46951	12189	34762

Note: Costs appear as positive numbers, while revenues and developer contributions appear as negative numbers.

Note: All entries are present values discounted to 2009, in 2009 prices

Analysis of Monetised Costs and Benefits

Greenhouse Gases	58
Economic Efficiency: Consumer Users (Commuting)	2962611
Economic Efficiency: Consumer Users (Other)	6483907
Economic Efficiency: Business Users and Providers	3005287
Wider Public Finances (Indirect Taxation Revenues)	-46951
Present Value of Benefits (PVB)	12404912
Broad Transport Budget	9445112
Present Value of Costs (PVC)	9445112
OVERALL IMPACTS	
Net Present Value (NPV)	2959800
Benefit to Cost Ratio (BCR)	1.313

Note: This table includes costs and benefits which are regularly or occasionally presented in monetised form in transport appraisals, together with some where monetisation is in prospect. There may also

be other significant costs and benefits, some of which cannot be presented in monetised form. Where this is the case, the analysis presented above does NOT provide a good measure of value for money and should not be used as the sole basis for decisions.

TUBA Run Information

- calculations completed

Appendix 4 Sources of Capital Cost Estimates

Sources of Capital Cost Estimates

The sources used in the development of capital cost estimates for the majority of schemes that comprise the GDA Transport Strategy are provided in Table A4.1.

Table A4.1: GDA Transport Strategy – Capital Cost Estimates

Scheme	Capital Cost (€m)	Source
DART Expansion	3,360	DART Expansion Programme
LR7 Metro North	2,180	Fingal / North Dublin Transport Study
South East Metro	1,500	Dublin South East Corridor Study ¹
South West BRT	80	Per km rate taken from Swords / Airport to City Centre ROA
Western Luas	630	Per km rate taken from Fingal / North Dublin Transport Study
Finglas Luas	180	Per km rate taken from Fingal / North Dublin Transport Study
Inner Orbital Bus	100	Per km rate from Dublin Inner Orbital Corridor Study
Outer Orbital Bus	140	Per km rate from Dublin Inner Orbital Corridor Study
Swiftway Swords to City	240	Per km rate taken from Swords / Airport to City Centre ROA
Swiftway Blanchardstown to UCD	290	Per km rate taken from Swords / Airport to City Centre ROA
Swiftway Clongriffin to Rathfarnham	190	Per km rate taken from Swords / Airport to City Centre ROA
Core Bus Services	240	€5m per km estimate
Road Schemes	680	€4m per km estimate
Total Capital Cost	9,810	

¹ see Section 5.4 of the Dublin South East Corridor Study. The cost estimate for 'Option 3 DART Enhancement + Metro South East' provided in Table 5-5 is €2,141m. Removing the cost of €641m for the DART Enhancement given in Table 5-4, which is assumed to be part of the 'Do Minimum' scenario in the Strategy, the cost of the South East Metro is €1,500m.