APPENDIX A

Appraisal Tables

A. Appraisal Summary Tables (ASTs), Transport Economic Efficiency Tables

A.1 This Appendix contains the detailed (TEE), Public Accounts and Summary Analysis Tables for:

- GBSTS strategy (Tables A.1 to A.4);
- GBSTS strategy with road user charging (Tables A.5 to A.8); and
- GBSTS strategy without Smarter Choices (Tables A.9 to A.12).

A.2 The values in each table refer to costs and benefits experienced over the full appraisal period (2016 to 2075) and are quoted in thousands of pounds in 2002 prices and values.

Table A.1 – Appraisal Summary Table for GBSTS Strategy

GBSTS Strategy		Problems: congested road network with lack of high quality public transport options		Present Value of Costs to Public Accounts £1,103M
OBJECTIVE	**SUB-OBJECTIVE**	**QUALITATIVE IMPACTS**	**QUANTITATIVE ASSESSMENT**	**ASSESSMENT**
Environment	Noise	Small net decrease in the number of people annoyed by noise (based on perceptible changes in noise levels). Increase in noise levels along new highway links on strategic road network. Decreases in noise spread across the study area network. The appraisal excludes the potential impacts attributable to the use of low noise surfacing and noise barriers in new schemes which would further reduce levels of noise pollution.	Number of zones experiencing noise impact: - Increase in population annoyed – 28 zones -No change in population annoyed – 82 zones - Decrease in population annoyed – 77 zones	Net decrease in estimated population annoyed of 16,800.
	Local Air Quality	Reduction in emission levels of NO_x and PM_{10} between 2003 and 2031 through increasing use of cleaner, more efficient engines and improved fuels. Further moderate improvements achieved in 2031 by the strategy for both NO_x (2%) and PM_{10} (4%) compared with Do Minimum. Within the local Air Quality Management Areas, there are reductions in emissions compared with 2031 Do Minimum. For NO_x reductions are 3% (Avonmouth), 7% (Bristol) and 8% (Bath) and for PM_{10} a 4% drop in Bath and no change in Avonmouth and Bristol. The appraisal excludes impacts attributable to possible supporting measures such as roadside emissions testing, low emission zones and the further development of low emissions technologies.	- Total annual emissions (tonnes) – NOx: - Base (2003) – 13033 - Do Minimum (2031) – 7150 - Strategy (2031) – 6980 Total annual emissions (tonnes) – PM_{10}: - Base (2003) – 416 - Do Minimum (2031) – 196 - Strategy (2031) – 188	Changes in: NO_x: -170 tonnes pa (-2.4% change) PM_{10}: -8 tonnes pa (-4.1% change)
	Greenhouse Gases	A moderate (5%) reduction in CO_2 emissions in 2031 making a contribution towards meeting the UK Government's obligations under the Kyoto agreement on tackling climate change. Due to growth in development between 2003 and 2031, the level of CO_2 emissions increases by 33% between 2003 and 2031 Do Minimum.	Total annual emissions (tonnes) – CO_2: - Base (2003) – 2027705 - Do Minimum (2031) – 2694531 - Strategy (2031) – 2559328	Changes in: CO_2 -135203 tonnes pa (-5.0% change)
	Landscape	Impacts of specific strategy measures on individual landscape designations: - South Bristol Ring Road – potential impacts at western and eastern ends of the route; - Airport Link Road – potentially significant impacts on landscape in the Wrington area - M5 Junction 17 – possible impact on local landscape designations to west of existing junction; and - A36 – A46 Link Road – potentially significant impact on AONB. Remedial measures may need to be included within the design as schemes are developed.	N/A	Potentially large adverse impact
	Townscape	Impacts of specific strategy measures on individual townscape designations: - South Bristol Ring Road – parts of the urban sections of the route (Bishport Ave, Hawkfield Rd, Hengrove Way, Cater Rd Link, King George's Rd, Highridge Grn) could have potential townscape impacts; and - Stoke Gifford Bypass – potential local impacts. Remedial measures may need to be included within the design as schemes are developed.	N/A	Potentially moderate adverse impact
	Heritage of Historic Resources	Impacts of specific strategy measures on individual heritage designations: - South Bristol Ring Road – runs through Avon Conservation Area in Highridge and Withywood area; - Airport Link Road – runs very close to Scheduled Ancient Monuments at Nye, Redhill and Felton; - Nailsea Bypass –passes close to, but does not directly impact on, a Scheduled Ancient Monument at Wraxall and listed garden at Tyntesfield; - Widening of A370 – lies close to a Scheduled Ancient Monument and runs through a narrow band of Avon Conservation Area; - Improvements to M32 Junction 1 – could potentially impact on Avon Conservation Area to the north-east of the junction; and - A36 – A46 Link Road – runs close to Avon Conservation Area. Remedial measures may need to be included within the design as schemes are developed.	N/A	Potentially moderate adverse impact
	Biodiversity	Impacts of specific strategy measures on individual biodiversity designations: - South Bristol Ring Road – runs close to small ancient woodland at eastern end; - Airport Link Road – skirts SSSI between Nye and Congresbury, crosses Local Nature Reserve along disused rail line between Congresbury and Winscombe, runs through ancient woodlands north of Wrington; - Nailsea Bypass – skirts northern boundary of SSSI across Tickenham Moor; - Second Avon Crossing – runs close to important bird area when it crosses River Avon; - Improvements to M5 Junctions 16 & 17 – close proximity to areas of ancient woodland; and - A36 – A46 Link Road – passes close to small SSSI. Remedial measures may need to be included within the design as schemes are developed.	N/A	Potentially moderate adverse impact
	Water Environment	Impacts of specific strategy measures on individual water environment designations: - South Bristol Ring Road – runs close to a number of landfill sites at western end; - Airport Link Road – crosses fluvial flood plain between Nye and Congresbury, crosses the flood plain of River Yeo to the south of Wrington, crosses Source Protection Zones near to BIA and runs close to landfill sites north of BIA; - Nailsea Bypass – runs through flood plain between Tickenham and Nailsea; - Second Avon Crossing – runs within tidal flood plain of River Avon and at southern end near to landfill sites; - Widening of A370 – runs close to landfill sites; - Widening of M4 between Junctions 19 and 20 – lies close to landfill sites and crosses Bradley Brook; - Stoke Gifford Bypass – crosses small streams; - Improvements to M5 Junctions 16 & 17 – close proximity to landfill site near Junction 17; and - A36 – A46 Link Road – crosses River Avon. Remedial measures may need to be included within the design as schemes are developed.	N/A	Potentially moderate adverse impact

GBSTS Strategy		Problems: congested road network with lack of high quality public transport options		Present Value of Costs to Public Accounts £1,103M
OBJECTIVE	SUB-OBJECTIVE	QUALITATIVE IMPACTS	QUANTITATIVE ASSESSMENT	ASSESSMENT
	Physical Fitness	Promotion of walking and cycling measures and reduced car use through transfer to public transport would increase physical activity and fitness.	N/A	Moderate beneficial impact
	Journey Ambience	Various measures potentially reduce stress for drivers (through improved journey reliability, e.g. Variable Message signs, reduced congestion) and public transport passengers (improved journey times, real-time passenger information).	N/A	Moderate beneficial impact
Safety	Accidents	Transfer of traffic onto new higher standard roads reduces overall accident levels.	Annual weekday casualty levels: 2003 – 398 KSI 2031 (Do Minimum) – 365 2031 (Strategy) - 329	PVB £681M
	Security	Improved public transport security through better facilities at stops, real-time passenger information.	N/A	Moderate beneficial impact
Economy	Public Accounts	Significant public sector expenditure, particularly on public transport and highway schemes.	Central Government PVC: £703M, Local Government PVC: £399M	PVC £1,103M
	Transport Economic Efficiency: Business Users and Transport Providers	Large travel time savings, especially for freight, with smaller vehicle operating cost savings. Significant time savings for public transport operators.	Users PVB: £13,743M, Transport Providers PVB: £4,414M, Other PVB: £0M	PVB: £18,158M
	Transport Economic Efficiency: Consumers	Large travel time savings for users, with smaller operating cost savings.	Users PVB: £15,603M	PVB: £15,603
	Reliability	Additional highway capacity will reduce congestion and improve reliability. Extended use of Variable Message Signs will improve reliability on the motorway network.	Proportion of vehicle-kms below capacity: Base – 91% Do Minimum – 69% Strategy – 86%	Moderate beneficial impact
	Wider Economic Impacts	Current and future population have improved accessibility to work particularly in south Bristol.		Moderate beneficial impact
Accessibility	Option Values	Significant increase in level of public transport provision through bus, rapid transit park and ride and rail improvements.	Increase in public transport capacity between Do Minimum and Strategy: Rail – 20% Bus and rapid transit – 102% Park and Ride – 109%	Large beneficial impact
	Severance	Individual highway schemes will increase local severance although detailed scheme design should include mitigation measures to maintain current links.	N/A	Slight adverse impact
	Access to Transport	Improved accessibility to main city/town centres. North Fringe and BIA for both public transport and highways.	Extra population within 60 mins – public transport Bristol city centre – 515,000 Bath city centre – 56,000 Weston-super-Mare – 53,000 North Fringe – 61,000 BIA – 62,000 Extra population within 30 mins – highways Bristol city centre – 623,000 Bath city centre – 21,000 Weston-super-Mare – 60,000 North Fringe – 210,000 BIA – 533,000	Large beneficial impact
	Accessibility for the Disabled	Introduction of new vehicles on bus, rapid transit and rail services with low floor access and designated areas for disabled.	N/A	Moderate beneficial impact
Integration	Transport Interchange	Improved interchange through developments including expansion of interchanges (at Worle, Bristol Parkway and UWE.), enhanced network of rapid transit and rail services, increased provision of park and ride. Improved real-time information for passengers.	N/A	Moderate beneficial impact
	Land-Use Policy	Spatial development forecasts have been key input to strategy development process. Close liaison with West of England Partnership in preparation of Sub-Regional Spatial Strategy.	N/A	Moderate beneficial impact
	Other Government Policies	Strategy assists other Government policies (e.g. sustainability and social inclusion) through improvements to public transport services and changes in mode split.	N/A	Moderate beneficial impact

Table A.2 – Transport Economic Efficiency Table for GBSTS Strategy

(60 year appraisal period, 2016 - 2075. Figures in £,000s, 2002 prices and values.
Positive values represent benefits, negative values represent costs.)

		ALL MODES	ROAD		BUS	RAPID TRANSIT	RAIL	PARK & RIDE
CONSUMER USER BENEFITS								
	Travel time	**15,229,783**	8,694,003		1,811,441	2,935,120	716,088	1,073,131
	Vehicle Operating costs	**524,213**	587,164		0	0	0	-62,952
	User charges	**-150,850**	-447,540		0	0	87,872	208,818
	Net Consumer Benefits	***15,603,145***	*8,833,627*		*1,811,441*	*2,935,120*	*803,960*	*1,218,998*
BUSINESS USER BENEFITS			**Cars**	**GV**				
	Travel time	**14,018,543**	8,082,270	4,097,896	325,154	1,017,565	495,657	0
	Vehicle Operating costs	**-201,190**	183,815	-385,005	0	0	0	0
	User charges	**-74,054**	-91,393	1,060	0	0	16,279	0
	Net Business User Benefits	***13,743,300***	*8,174,692*	*3,713,952*	*325,154*	*1,017,565*	*511,936*	*0*
PRIVATE SECTOR PROVIDER IMPACTS								
	Revenue	**5,066,796**	0	0	668,847	2,761,569	990,073	646,308
	Operating costs	**-652,322**	0	0	-76,236	-181,196	-337,639	-57,251
	Investment costs	**0**	0	0	0	0	0	0
	Grant/subsidy	**0**	0	0	0	0	0	0
	Net Private Sector Provider Benefits	***4,414,474***	*0*	*0*	*592,610*	*2,580,373*	*652,434*	*589,057*
	Net Business Impact	**18,157,774**						
PV OF TEE BENEFITS (PVB)		**33,760,919**						

Table A.3 – Public Accounts Table for GBSTS Strategy

(60 year appraisal period, 2016 - 2075. Figures in £,000s, 2002 prices and values.
Positive values represent costs, negative values represent benefits.)

		ALL MODES	ROAD	BUS	RAPID TRANSIT	RAIL	PARK & RIDE
LOCAL GOVERNMENT FUNDING							
	Revenue	**-268,278**	-268,312	0	0	0	34
	Operating Costs	**24,246**	24,246	0	0	0	0
	Investment Costs	**643,450**	432,298	43,104	100,322	11,620	56,107
	Developer Contributions	**0**	0	0	0	0	0
	Grant/Subsidy Payments	**0**	0	0	0	0	0
	Net Impact	***399,418***	*188,232*	*43,104*	*100,322*	*11,620*	*56,140*
CENTRAL GOVERNMENT FUNDING			**0**	0	0	0	0
	Revenue	**0**	0	0	0	0	0
	Operating Costs	**0**	0	0	0	0	0
	Investment Costs	**0**	0	0	0	0	0
	Developer Contributions	**0**	0	0	0	0	0
	Grant/Subsidy Payments	**0**	0	0	0	0	0
	Indirect Tax Revenues	**703,417**	-35,652	108,216	453,137	158,915	18,802
	Net Impact	***703,417***	*-35,652*	*108,216*	*453,137*	*158,915*	*18,802*
TOTAL PRESENT VALUE OF COSTS							
	(PVC)	**1,102,835**					

Table A.4 – Public Accounts Table for GBSTS Strategy

(60 year appraisal period, 2016 - 2075. Figures in £,000s, 2002 prices and values.

ANALYSIS OF MONETISED COSTS AND BENEFITS			
	Non-Exchequer Impacts		
		Consumer User Benefits	15,603,145
		Business User Benefits	13,743,300
		Private Sector Provider Impacts	4,414,474
		Other Business Impacts	0
	Accident Benefits		681,299
Net Present Value of Benefits (PVB)			**34,442,219**
	Local Government Funding		399,418
	Central Government Funding		703,417
Net present Value Costs (PVC)			**1,102,835**
Overall Impact			
	Net present Value (NPV)		**33,339,383**
	Benefit to Cost Ratio (BCR)		**31**
	HA Benefit to Cost Ratio (BKR)		**26**

Table A.5 – Appraisal Summary Table for GBSTS Strategy with Road User Charging

GBSTS Strategy with Road User Charging			Problems: Congested road network with lack of high quality public transport options	Present Value of Costs to Public Accounts £10,341M
OBJECTIVE	**SUB-OBJECTIVE**	**QUALITATIVE IMPACTS**	**QUANTITATIVE ASSESSMENT**	**ASSESSMENT**
Environment	Noise	Small net decrease in the number of people annoyed by perceptible change in noise levels. Increase in noise levels along new highway links on strategic road network. Decreases in noise spread across the study area network. The appraisal excludes the potential impacts attributable to the use of low noise surfacing and noise barriers in new schemes which would further reduce levels of noise pollution.	Number of zones experiencing noise impact: - Increase in population annoyed – 29 zones - No change in population annoyed – 74 zones - Decrease in population annoyed – 84 zones	Net decrease in estimated population annoyed of 125,300.
	Local Air Quality	Reduction in emission levels of NO_x and PM_{10} between 2003 and 2031 through increasing use of cleaner, more efficient engines and improved fuels. Further moderate improvements achieved in 2031 by the strategy with RUC for both NO_x (4%) and PM_{10} (6%) compared with Do Minimum. Within the local Air Quality Management Areas, there are reductions in emissions compared with 2031 Do Minimum. For NO_x reductions are 3% (Avonmouth), 10% (Bristol) and 9% (Bath) and for PM_{10} a 6% drop in Bath, a 4% drop in Bristol and no change in Avonmouth. The appraisal excludes impacts attributable to possible supporting measures such as roadside emissions testing, low emission zones and the further development of low emissions technologies.	Total annual emissions (tonnes) – NO_x: - Base (2003) – 13033 - Do Minimum (2031) – 7150 - Strategy with RUC (2031) – 6874 Total annual emissions (tonnes) – PM_{10}: - Base (2003) – 416 - Do Minimum (2031) – 196 - Strategy with RUC (2031) – 184	Changes in: NO_x: - 276 tonnes pa (-3.9% change) PM_{10}: - 12 tonnes pa (-6.1% change)
	Greenhouse Gases	A moderate (8%) reduction in CO_2 emissions in 2031 making a contribution towards meeting the UK Government's obligations under the Kyoto agreement on tackling climate change. Due to growth in development between 2003 and 2031, the level of CO_2 emissions increases by 33% between 2003 and 2031 Do Minimum.	Total annual emissions (tonnes) – CO_2: - Base (2003) – 2027705 - Do Minimum (2031) – 2694531 - Strategy with RUC (2031) – 2479879	Changes in: CO_2 -214652 tonnes pa (-8.0% change)
	Landscape	Impacts of specific strategy measures on individual landscape designations: - South Bristol Ring Road – potential impacts at western and eastern ends of the route; - Airport Link Road – potentially significant impacts on landscape in the Wrington area - M5 Junction 17 – possible impact on local landscape designations to west of existing junction; and - A36 – A46 Link Road – potentially significant impact on AONB. Remedial measures may need to be included within the design as schemes are developed.	N/A	Potentially large adverse impact
	Townscape	Impacts of specific strategy measures on individual townscape designations: - South Bristol Ring Road – parts of the urban sections of the route (Bishport Ave, Hawkfield Rd, Hengrove Way, Cater Rd Link, King George's Rd, Highridge Grn) could have potential townscape impacts; and - Stoke Gifford Bypass – potential local impacts. Remedial measures may need to be included within the design as schemes are developed.	N/A	Potentially moderate adverse impact
	Heritage of Historic Resources	Impacts of specific strategy measures on individual heritage designations: - South Bristol Ring Road – runs through Avon Conservation Area in Highridge and Withywood area; - Airport Link Road – runs very close to Scheduled Ancient Monuments at Nye, Redhill and Felton; - Nailsea Bypass –passes close to, but does not directly impact on, a Scheduled Ancient Monument at Wraxall and listed garden at Tyntesfield; - Widening of A370 – lies close to a Scheduled Ancient Monument and runs through a narrow band of Avon Conservation Area; - Improvements to M32 Junction 1 – could potentially impact on Avon Conservation Area to the north-east of the junction; and - A36 – A46 Link Road – runs close to Avon Conservation Area. Remedial measures may need to be included within the design as schemes are developed.	N/A	Potentially moderate adverse impact
	Biodiversity	Impacts of specific strategy measures on individual biodiversity designations: - South Bristol Ring Road – runs close to small ancient woodland at eastern end; - Airport Link Road – skirts SSSI between Nye and Congresbury, crosses Local Nature Reserve along disused rail line between Congresbury and Winscombe, runs through ancient woodlands north of Wrington; - Nailsea Bypass – skirts northern boundary of SSSI across Tickenham Moor; - Second Avon Crossing – runs close to important bird area when it crosses River Avon; - Improvements to M5 Junctions 16 & 17 – close proximity to areas of ancient woodland; and - A36 – A46 Link Road – passes close to small SSSI. Remedial measures may need to be included within the design as schemes are developed.	N/A	Potentially moderate adverse impact
	Water Environment	Impacts of specific strategy measures on individual water environment designations: - South Bristol Ring Road – runs close to a number of landfill sites at western end; - Airport Link Road – crosses fluvial flood plain between Nye and Congresbury, crosses the flood plain of River Yeo to the south of Wrington, crosses Source Protection Zones near to BIA and runs close to landfill sites north of BIA; - Nailsea Bypass – runs through flood plain between Tickenham and Nailsea; - Second Avon Crossing – runs within tidal flood plain of River Avon and at southern end near to landfill sites; - Widening of A370 – runs close to landfill sites; - Widening of M4 between Junctions 19 and 20 – lies close to landfill sites and crosses Bradley Brook; - Stoke Gifford Bypass – crosses small streams; - Improvements to M5 Junctions 16 & 17 – close proximity to landfill site near Junction 17; and - A36 – A46 Link Road – crosses River Avon. Remedial measures may need to be included within the design as schemes are developed.	N/A	Potentially moderate adverse impact
	Physical Fitness	Promotion of walking and cycling measures and reduced car use through transfer to public transport would increase physical activity and fitness.	N/A	Large beneficial impact
	Journey Ambience	Various measures potentially reduce stress for drivers (through improved journey reliability, e.g. Variable Message signs, reduced congestion) and public transport passengers (improved journey times, real-time passenger information).	N/A	Moderate beneficial impact
Safety	Accidents	Transfer of traffic onto new higher standard roads reduces overall accident levels.	Annual weekday casualty levels (KSI): 2003 – 398 2031 (Do Minimum) – 365 2031 (Strategy with RUC) - 316	PVB £923M
	Security	Improved public transport security through better facilities at stops, real-time passenger information.	N/A	Moderate beneficial impact
Economy	Public Accounts	Large revenues accruing to local authority through road user charging which offsets government expenditure.	Central Government PVC: £2,230M, Local Government PVC: - £12,571M	PVC - £10,341M
	Transport Economic Efficiency: Business Users and Transport Providers	Large travel time savings, especially for freight, with smaller vehicle operating cost savings. Significant time savings for public transport operators.	Users PVB: £12,840M, Transport Providers PVB: £5,036M, Other PVB: £0M	PVB: £17,875M
	Transport Economic Efficiency: Consumers	Large travel time savings for users but offset by suppressed trips through road user charging.	Users PVB: £9,736M	PVB: £9,736
	Reliability	Additional highway capacity will reduce congestion and improve reliability. Extended use of Variable Message Signs will improve reliability on the motorway network.	Proportion of vehicle-kms below capacity: Base – 91% Do Minimum – 69% Strategy with RUC – 91%	Large beneficial impact
	Wider Economic Impacts	Current and future population have improved accessibility to work particularly in south Bristol.		Moderate beneficial impact

GBSTS Strategy with Road User Charging			Problems: Congested road network with lack of high quality public transport options	Present Value of Costs to Public Accounts £10,341M
OBJECTIVE	**SUB-OBJECTIVE**	**QUALITATIVE IMPACTS**	**QUANTITATIVE ASSESSMENT**	**ASSESSMENT**
Accessibility	Option Values	Significant increase in level of public transport provision through bus, rapid transit park and ride and rail improvements.	Increase in public transport capacity between Do Minimum and Strategy: Rail – 20% Bus and rapid transit – 102% Park and Ride – 109%	Large beneficial impact
	Severance	Individual highway schemes will increase local severance although detailed scheme design should include mitigation measures to maintain current links.	N/A	Slight adverse impact
	Access to Transport	Improved accessibility to main city/town centres. North Fringe and BIA for both public transport and highways.	Extra population within 60 mins – public transport Bristol city centre – 524,000 Bath city centre – 56,000 Weston-super-Mare – 53,000 North Fringe – 75,000 BIA – 73,000 Extra population within 30 mins – highways Bristol city centre – 653,000 Bath city centre – 812,000 Weston-super-Mare – 74,000 North Fringe – 296,000 BIA – 659,000	Large beneficial impact
	Accessibility for the Disabled	Introduction of new vehicles on bus, rapid transit and rail services with low floor access and designated areas for disabled.	N/A	Moderate beneficial impact
Integration	Transport Interchange	Improved interchange through developments including expansion of interchanges (at Worle, Bristol Parkway and UWE.), enhanced network of rapid transit and rail services, increased provision of park and ride. Improved real-time information for passengers.	N/A	Moderate beneficial impact
	Land-Use Policy	Spatial development forecasts have been key input to strategy development process. Close liaison with West of England Partnership in preparation of Sub-Regional Spatial Strategy.	N/A	Moderate beneficial impact
	Other Government Policies	Strategy assists other Government policies (e.g. sustainability and social inclusion) through improvements to public transport services and changes in mode split.	N/A	Moderate beneficial impact

Table A.6 – Transport Economic Efficiency Table for GBSTS Strategy with RUC

(60 year appraisal period, 2016 - 2075. Figures in £000s, 2002 prices and values.
Positive values represent benefits, negative values represent costs.)

		ALL MODES	ROAD		BUS	RAPID TRANSIT	RAIL	PARK & RIDE
CONSUMER USER BENEFITS								
	Travel time	**17,502,481**	10,431,287		2,189,329	3,092,315	709,724	1,079,826
	Vehicle Operating costs	**628,481**	698,446		0	0	0	-69,965
	User charges	**-8,394,965**	-8,576,874		0	0	90,756	91,153
	Net Consumer Benefits	***9,735,997***	*2,552,859*		*2,189,329*	*3,092,315*	*800,480*	*1,101,014*
BUSINESS USER BENEFITS			**Cars**	**GV**				
	Travel time	**17,195,076**	10,077,585	5,228,740	391,400	1,005,535	491,817	0
	Vehicle Operating costs	**-556,978**	201,718	-758,696	0	0	0	0
	User charges	**-3,798,366**	-1,604,085	-2,210,310	0	0	16,029	0
	Net Business User Benefits	***12,839,732***	*8,675,218*	*2,259,733*	*391,400*	*1,005,535*	*507,846*	*0*
PRIVATE SECTOR PROVIDER IMPACTS								
	Revenue	**5,687,856**	0	0	1,054,465	2,841,805	1,144,584	647,002
	Operating costs	**-652,322**	0	0	-76,236	-181,196	-337,639	-57,251
	Investment costs	**0**	0	0	0	0	0	0
	Grant/subsidy	**0**	0	0	0	0	0	0
	Net Private Sector Provider Benefits	***5,035,534***	*0*	*0*	*978,229*	*2,660,608*	*806,945*	*589,751*
	Net Business Impact	**17,875,265**						
PV OF TEE BENEFITS (PVB)		**27,611,262**						

Table A.7 – Public Accounts Table for GBSTS Strategy with RUC

(60 year appraisal period, 2016 - 2075. Figures in £,000s, 2002 prices and values. Positive values represent costs, negative values represent benefits.)

		ALL MODES	ROAD	BUS	RAPID TRANSIT	RAIL	PARK & RIDE
LOCAL GOVERNMENT FUNDING							
	Revenue	**-13,257,972**	-13,487,844	0	0	0	229,872
	Operating Costs	**24,246**	24,246	0	0	0	0
	Investment Costs	**662,839**	451,687	43,104	100,322	11,620	56,107
	Developer Contributions	**0**	0	0	0	0	0
	Grant/Subsidy Payments	**0**	0	0	0	0	0
	Net Impact	***-12,570,887***	*-13,011,911*	*43,104*	*100,322*	*11,620*	*285,979*
CENTRAL GOVERNMENT FUNDING							
	Revenue	**0**	0	0	0	0	0
	Operating Costs	**0**	0	0	0	0	0
	Investment Costs	**0**	0	0	0	0	0
	Developer Contributions	**0**	0	0	0	0	0
	Grant/Subsidy Payments	**0**	0	0	0	0	0
	Indirect Tax Revenues	**2,229,567**	1,353,460	172,197	467,547	185,989	50,375
	Net Impact	***2,229,567***	*1,353,460*	*172,197*	*467,547*	*185,989*	*50,375*
TOTAL PRESENT VALUE OF COSTS							
	(PVC)	**-10,341,319**					

Table A.8 – Public Accounts Table for GBSTS Strategy with RUC

(60 year appraisal period, 2016 - 2075. Figures in £,000s, 2002 prices and values.

ANALYSIS OF MONETISED COSTS AND BENEFITS			
	Non-Exchequer Impacts		
		Consumer User Benefits	9,735,997
		Business User Benefits	12,839,732
		Private Sector Provider Impacts	5,035,534
		Other Business Impacts	0
	Accident Benefits		923,206
Net Present Value of Benefits (PVB)			**28,534,469**
	Local Government Funding		-12,570,887
	Central Government Funding		2,229,567
Net present Value Costs (PVC)			**-10,341,319**
Overall Impact			
	Net present Value (NPV)		**38,875,788**
	Benefit to Cost Ratio (BCR)		**-3**
	HA Benefit to Cost Ratio (BKR)		**30**

Table A.9 – Appraisal Summary Table for GBSTS Strategy without Smarter Choices

GBSTS Strategy without Smarter Choices			Problems: Congested road network with lack of high quality public transport options	Present Value of Costs to Public Accounts £750M
OBJECTIVE	**SUB-OBJECTIVE**	**QUALITATIVE IMPACTS**	**QUANTITATIVE ASSESSMENT**	**ASSESSMENT**
Environment	Noise	Small net decrease in the number of people annoyed by perceptible change in noise levels. Increase in noise levels along new highway links on strategic road network. Decreases in noise spread across the study area network. The appraisal excludes the potential impacts attributable to the use of low noise surfacing and noise barriers in new schemes which would further reduce levels of noise pollution.	Number of zones experiencing noise impact: - Increase in population annoyed – 30 zones - No change in population annoyed – 94 zones - Decrease in population annoyed – 63 zones	Net increase in estimated population annoyed of 79,500.
	Local Air Quality	Reduction in emission levels of NO_x and PM_{10} between 2003 and 2031 through increasing use of cleaner, more efficient engines and improved fuels. Further small improvements achieved in 2031 by the strategy for both NO_x (negligible %) and PM_{10} (1%) compared with Do Minimum. Within the local Air Quality Management Areas, there are reductions in emissions compared with 2031 Do Minimum. For NO_x reductions are 3% (Avonmouth), 5% (Bristol) and 6% (Bath) and for PM_{10} a 3% drop in Bath and no change in Avonmouth and Bristol. The appraisal excludes impacts attributable to possible supporting measures such as roadside emissions testing, low emission zones and the further development of low emissions technologies.	Total annual emissions (tonnes) – NO_x: - Base (2003) – 13033 - Do Minimum (2031) – 7150 - Strategy without Smarter Choices (2031) – 7117 Total annual emissions (tonnes) – PM_{10}: - Base (2003) – 416 - Do Minimum (2031) – 196 - Strategy without Smarter Choices (2031) – 194	Changes in: NO_x: -33 tonnes pa (-0.5% change) PM_{10}: -2 tonnes pa (-1.0% change)
	Greenhouse Gases	A small (2%) reduction in CO_2 emissions in 2031 making a contribution towards meeting the UK Government's obligations under the Kyoto agreement on tackling climate change. Due to growth in development between 2003 and 2031, the level of CO_2 emissions increases by 33% between 2003 and 2031 Do Minimum.	Total annual emissions (tonnes) – CO_2: - Base (2003) – 2027705 - Do Minimum (2031) – 2694531 - Strategy without Smarter Choices (2031) – 2649771	Changes in: CO_2 -44760 tonnes pa (-1.7% change)
	Landscape	Impacts of specific strategy measures on individual landscape designations: - South Bristol Ring Road – potential impacts at western and eastern ends of the route; - Airport Link Road – potentially significant impacts on landscape in the Wrington area - M5 Junction 17 – possible impact on local landscape designations to west of existing junction; and - A36 – A46 Link Road – potentially significant impact on AONB. Remedial measures may need to be included within the design as schemes are developed.	N/A	Potentially large adverse impact
	Townscape	Impacts of specific strategy measures on individual townscape designations: - South Bristol Ring Road – parts of the urban sections of the route (Bishport Ave, Hawkfield Rd, Hengrove Way, Cater Rd Link, King George's Rd, Highridge Grn) could have potential townscape impacts; and - Stoke Gifford Bypass – potential local impacts. Remedial measures may need to be included within the design as schemes are developed.	N/A	Potentially moderate adverse impact
	Heritage of Historic Resources	Impacts of specific strategy measures on individual heritage designations: - South Bristol Ring Road – runs through Avon Conservation Area in Highridge and Withywood area; - Airport Link Road – runs very close to Scheduled Ancient Monuments at Nye, Redhill and Felton; - Nailsea Bypass –passes close to, but does not directly impact on, a Scheduled Ancient Monument at Wraxall and listed garden at Tyntesfield; - Widening of A370 – lies close to a Scheduled Ancient Monument and runs through a narrow band of Avon Conservation Area; - Improvements to M32 Junction 1 – could potentially impact on Avon Conservation Area to the north-east of the junction; and - A36 – A46 Link Road – runs close to Avon Conservation Area. Remedial measures may need to be included within the design as schemes are developed.	N/A	Potentially moderate adverse impact
	Biodiversity	Impacts of specific strategy measures on individual biodiversity designations: - South Bristol Ring Road – runs close to small ancient woodland at eastern end; - Airport Link Road – skirts SSSI between Nye and Congresbury, crosses Local Nature Reserve along disused rail line between Congresbury and Winscombe, runs through ancient woodlands north of Wrington; - Nailsea Bypass – skirts northern boundary of SSSI across Tickenham Moor; - Second Avon Crossing – runs close to important bird area when it crosses River Avon; - Improvements to M5 Junctions 16 & 17 – close proximity to areas of ancient woodland; and - A36 – A46 Link Road – passes close to small SSSI. Remedial measures may need to be included within the design schemes are developed.	N/A	Potentially moderate adverse impact
	Water Environment	Impacts of specific strategy measures on individual water environment designations: - South Bristol Ring Road – runs close to a number of landfill sites at western end; - Airport Link Road – crosses fluvial flood plain between Nye and Congresbury, crosses the flood plain of River Yeo to the south of Wrington, crosses Source Protection Zones near to BIA and runs close to landfill sites north of BIA; - Nailsea Bypass – runs through flood plain between Tickenham and Nailsea; - Second Avon Crossing – runs within tidal flood plain of River Avon and at southern end near to landfill sites; - Widening of A370 – runs close to landfill sites; - Widening of M4 between Junctions 19 and 20 – lies close to landfill sites and crosses Bradley Brook; - Stoke Gifford Bypass – crosses small streams; - Improvements to M5 Junctions 16 & 17 – close proximity to landfill site near Junction 17; and - A36 – A46 Link Road – crosses River Avon. Remedial measures may need to be included within the design as schemes are developed.	N/A	Potentially moderate adverse impact
	Physical Fitness	Promotion of walking and cycling measures and reduced car use through transfer to public transport would increase physical activity and fitness.	N/A	Moderate beneficial impact
	Journey Ambience	Various measures potentially reduce stress for drivers (through improved journey reliability, e.g. Variable Message signs, reduced congestion) and public transport passengers (improved journey times, real-time passenger information).	N/A	Moderate beneficial impact
Safety	Accidents	Transfer of traffic onto new higher standard roads reduces overall accident levels.	Annual weekday casualty levels (KSI): 2003 – 398 2031 (Do Minimum) – 365 2031 (Strategy without Smarter Choices) - 349	PVB £322M
	Security	Improved public transport security through better facilities at stops, real-time passenger information.	N/A	Moderate beneficial impact
Economy	Public Accounts	Significant public sector expenditure, particularly on public transport and highway schemes.	Central Government PVC: £551M, Local Government PVC: £199M	PVC £750M
	Transport Economic Efficiency: Business Users and Transport Providers	Large travel time savings, especially for freight with smaller vehicle operating cost savings. Significant time savings for public transport operators.	Users PVB: £9,800M, Transport Providers PVB: £3,373M, Other PVB: £0M	PVB: £13,173M
	Transport Economic Efficiency: Consumers	Large travel time savings for transport users, with smaller operating cost savings.	Users PVB: £12,213M	PVB: £12,213
	Reliability	Additional highway capacity will reduce congestion and improve reliability. Extended use of Variable Message Signs will improve reliability on the motorway network.	Proportion of vehicle-kms below capacity: Base – 91% Do Minimum – 69% Strategy without Smarter Choices – 76%	Slight beneficial impact
	Wider Economic Impacts	Current and future population have improved accessibility to work, particularly in south Bristol.		Moderate beneficial impact

GBSTS Strategy without Smarter Choices			Problems: Congested road network with lack of high quality public transport options	Present Value of Costs to Public Accounts £750M
OBJECTIVE	**SUB-OBJECTIVE**	**QUALITATIVE IMPACTS**	**QUANTITATIVE ASSESSMENT**	**ASSESSMENT**
Accessibility	Option Values	Significant increase in level of public transport provision through bus, rapid transit park and ride and rail improvements.	Increase in public transport capacity between Do Minimum and Strategy: Rail – 20% Bus and rapid transit – 102% Park and Ride – 109%	Large beneficial impact
	Severance	Individual highway schemes will increase local severance although detailed scheme design should include mitigation measures to maintain current links.	N/A	Slight adverse impact
	Access to Transport	Improved accessibility to main city/town centres. North Fringe and BIA for both public transport and highways.	Extra population within 60 mins – public transport Bristol city centre – 476,000 Bath city centre – 56,000 Weston-super-Mare – 50,000 North Fringe – 52,000 BIA – 62,000 Extra population within 30 mins – highways Bristol city centre – 587,000 Bath city centre – 9,000 Weston-super-Mare – 9,000 North Fringe – 220,000 BIA – 471,000	Large beneficial impact
	Accessibility for the Disabled	Introduction of new vehicles on bus, rapid transit and rail services with low floor access and designated areas for disabled.	N/A	Moderate beneficial impact
Integration	Transport Interchange	Improved interchange through developments including expansion of interchanges (at Worle, Bristol Parkway and UWE.), enhanced network of rapid transit and rail services, increased provision of park and ride. Improved real-time information for passengers.	N/A	Moderate beneficial impact
	Land-Use Policy	Spatial development forecasts have been key input to strategy development process. Close liaison with West of England Partnership in preparation of Sub-Regional Spatial Strategy.	N/A	Moderate beneficial impact
	Other Government Policies	Strategy assists other Government policies (e.g. sustainability and social inclusion) through improvements to public transport services and changes in mode split.	N/A	Moderate beneficial impact

Table A.10 – Transport Economic Efficiency Table for GBSTS Strategy without 'Smarter Choices'

(60 year appraisal period, 2016 - 2075. Figures in £000s, 2002 prices and values.
Positive values represent benefits, negative values represent costs.)

		ALL MODES	ROAD		BUS	RAPID TRANSIT	RAIL	PARK & RIDE
CONSUMER USER BENEFITS								
	Travel time	**12,276,058**	6,156,285		1,597,521	2,823,309	740,782	958,161
	Vehicle Operating costs	**204,735**	254,066		0	0	0	-49,331
	User charges	**-268,237**	-515,222		0	0	69,400	177,585
	Net Consumer Benefits	***12,212,556***	*5,895,129*		*1,597,521*	*2,823,309*	*810,182*	*1,086,416*
BUSINESS USER BENEFITS			**Cars**	**GV**				
	Travel time	**9,896,700**	5,351,674	2,746,796	298,464	1,013,070	486,695	0
	Vehicle Operating costs	**-17,144**	121,864	-139,008	0	0	0	0
	User charges	**-79,834**	-94,501	859	0	0	13,808	0
	Net Business User Benefits	***9,799,722***	*5,379,037*	*2,608,647*	*298,464*	*1,013,070*	*500,503*	*0*
PRIVATE SECTOR PROVIDER IMPACTS								
	Revenue							
	Operating costs	**4,025,577**	0	0	423,818	2,655,681	496,583	449,495
	Investment costs	**-652,322**	0	0	-76,236	-181,196	-337,639	-57,251
	Grant/subsidy	**0**	0	0	0	0	0	0
	Net Private Sector Provider Benefits	***0***	*0*	*0*	*0*	*0*	*0*	*0*
	Net Business Impact	**13,172,977**						
PV OF TEE BENEFITS (PVB)		**25,385,534**						

Table A.11 – Public Accounts Table for GBSTS Strategy without 'Smarter Choices'

(60 year appraisal period, 2016 - 2075. Figures in £000s, 2002 prices and values.
Positive values represent costs, negative values represent benefits.)

		ALL MODES	ROAD	BUS	RAPID TRANSIT	RAIL	PARK & RIDE
LOCAL GOVERNMENT FUNDING							
	Revenue	**-443,971**	-444,043	0	0	0	72
	Operating Costs	**0**	0	0	0	0	0
	Investment Costs	**643,450**	432,298	43,104	100,322	11,620	56,107
	Developer Contributions	**0**	0	0	0	0	0
	Grant/Subsidy Payments	**0**	0	0	0	0	0
	Net Impact	***199,479***	*-11,745*	*43,104*	*100,322*	*11,620*	*56,179*
CENTRAL GOVERNMENT FUNDING							
	Revenue	**0**	0	0	0	0	0
	Operating Costs	**0**	0	0	0	0	0
	Investment Costs	**0**	0	0	0	0	0
	Developer Contributions	**0**	0	0	0	0	0
	Grant/Subsidy Payments	**0**	0	0	0	0	0
	Indirect Tax Revenues	**550,901**	-23,992	65,858	434,832	73,164	1,039
	Net Impact	***550,901***	*-23,992*	*65,858*	*434,832*	*73,164*	*1,039*
TOTAL PRESENT VALUE OF COSTS							
	(PVC)	**750,380**					

Table A.12 – Public Accounts Table for GBSTS Strategy without 'Smarter Choices'

(60 year appraisal period, 2016 - 2075. Figures in £000s, 2002 prices and values.

ANALYSIS OF MONETISED COSTS AND BENEFITS			
	Non-Exchequer Impacts		
		Consumer User Benefits	12,212,556
		Business User Benefits	9,799,722
		Private Sector Provider Impacts	3,373,255
		Other Business Impacts	0
	Accident Benefits		321,805
Net Present Value of Benefits (PVB)			**25,707,339**
	Local Government Funding		199,479
	Central Government Funding		550,901
Net present Value Costs (PVC)			**750,380**
Overall Impact			
	Net present Value (NPV)		**24,956,959**
	Benefit to Cost Ratio (BCR)		**34**
	HA Benefit to Cost Ratio (BKR)		**20**