

DfT Queries on LEB – 24/10/16

Reduced High Growth Scenario (p=2.0)

DfT queried the reduction in benefits associated with the high growth scenario compared to the core. Mouchel postulated that the reasoning for the reduction was capacity constraints on the LEB flow volumes limiting benefits accrued to the scheme. An approach to testing this theory was derived whereby reduced growth was calculated to assure that the model process works appropriately within the stable flow range of the traffic model.

The method selected to achieve this was to vary the high growth factor from p=2.5 down to p=2.0. The tables below present the matrix totals for the high growth scenario (p=2.5) and for the revised high growth scenario (p=2.0) respectively. Globally the reduction for the 2018 matrices was in the region of 0.8% while the reduction for the 2033 matrices was 1.9% compared with the earlier high growth

Table 1 Original (p=2.5) High Growth scenario matrix totals

User Class	2018			2033		
	AM	IP	PM	AM	IP	PM
UC1	29,322	7,051	23,935	32,803	7,821	26,845
UC2	20,588	39,251	25,485	24,831	47,772	30,295
UC3	6,018	5,238	5,846	6,716	5,847	6,557
LGV	10,243	9,560	9,817	15,111	14,103	14,483
HGV	2,724	3,898	1,976	3,179	4,554	2,303
Total	68,895	64,997	67,058	82,640	80,097	80,483

Table 2 Revised (p=2.0) High Growth scenario matrix totals

User Class	2018			2033		
	AM	IP	PM	AM	IP	PM
UC1	29,079	6,992	23,736	32,174	7,671	26,330
UC2	20,417	38,925	25,273	24,354	46,856	29,714
UC3	5,968	5,194	5,797	6,587	5,735	6,431
LGV	10,158	9,480	9,735	14,821	13,833	14,205
HGV	2,702	3,865	1,960	3,118	4,467	2,259
Total	68,323	64,457	66,502	81,055	78,561	78,939

The VDM model was run and outputs extracted. Performance on the LEB is indicated below for the p=2 test. Section 2 PM peak operates with 10% increase in flow volume and greater LOS than the p=2.5 test (7% growth and 96% V/C ratio). Hence the assignment is operating more efficiently than for the p=2.5 scenario.

Table 3 Flows change and v/c by LEB Section

Section	Growth 2018 -2033			2033 V/C Ratio		
	AM	IP	PM	AM	IP	PM
Section 1a	14%	14%	4%	62%	56%	68%
Section 1b	12%	15%	11%	65%	56%	65%
Section 2	11%	18%	10%	86%	85%	98%
Section 3	10%	22%	1%	63%	60%	63%
Section 4	6%	20%	3%	59%	56%	67%

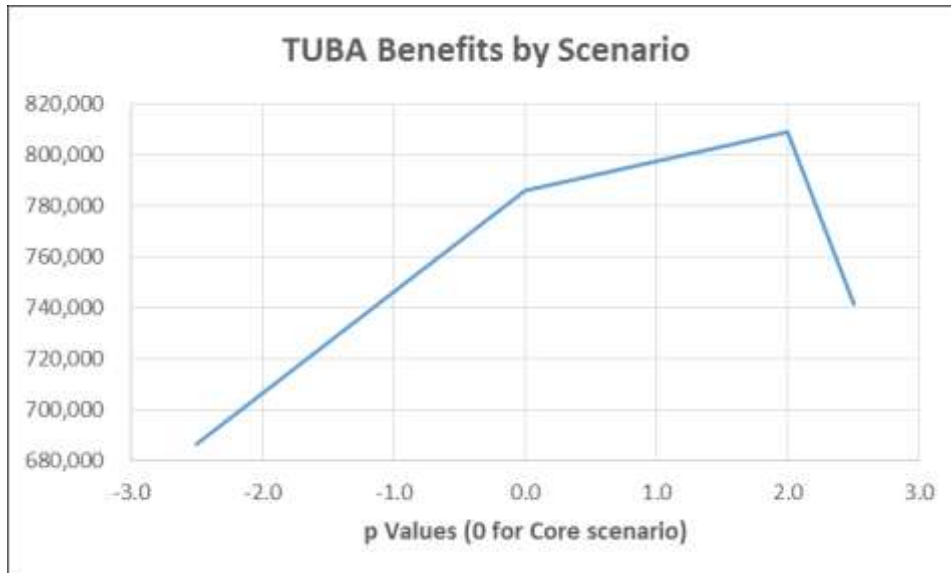
The table below presents the TUBA benefits summary for the three original scenarios and for the revised high growth scenario. It can be observed that the benefits for the revised high growth scenario are higher than what was obtained for the original high growth scenario.

Table 4 TUBA benefits summary

Transport Efficiency	Low	Core	High (p2.0)	High (p2.5)
Consumer User (Commute)	66,320	62,709	68,887	62,235
Consumer User (Other)	283,168	316,237	317,623	301,974
Business User and Provider	325,006	398,213	414,487	369,059
Indirect Tax Revenue	18,793	12,582	11,022	11,793
Greenhouse Gas	-6,543	-3,797	-3,192	-3,568
Present Value of Benefits (PVB)	686,744	785,944	808,827	741,493
Broad Transport Budget				
Investment Costs	79,789	79,789	79,789	79,789
Operating Costs				
Present Value of Costs (PVC)	79,789	79,789	79,789	79,789
Overall Impacts				
Net Present Value (NPV)	606,955	706,155	729,038	661,704
Benefit to Cost Ratio (BCR)	8.607	9.850	10.137	9.293
Total Benefits by Period				
AM peak - 2018	1,430	1,467	1,880	1,849
AM peak - 2033	1,366	1,527	1,801	1,515
PM peak - 2018	2,713	2,915	2,664	2,694
PM peak - 2033	2,393	2,029	2,090	1,574
Inter-peak - 2018	6,966	7,812	8,992	9,057
Inter-peak - 2033	7,096	8,904	8,824	8,141
Off-peak - 2018	1,487	1,624	1,852	1,857
Off-peak - 2033	1,397	1,651	1,642	1,602
Weekend - 2018	1,486	1,620	1,847	1,852
Weekend - 2033	1,389	1,640	1,629	1,589
AM peak - Total	69,506	76,304	90,876	78,358
PM peak - Total	122,968	107,705	108,336	86,464
Inter-peak - Total	357,845	439,614	444,384	415,221
Off-peak - Total	71,665	83,322	84,523	82,816
Weekend - Total	71,304	82,798	83,901	82,201

The graph below shows that beyond a certain level of future demand the benefits start to decline. This can be attributed to the model network being stressed beyond the practical capacity of a single lane alignment. At this stage the benefits of a new alignment are less discernible.

Figure 1 TUBA benefits by scenario



These results demonstrate that a lowering of the high growth traffic scenario demonstrates plausible results.