A52 CLIFTON BRIDGE TO BINGHAM
MULTI-MODAL STUDY

FINAL REPORT – ANNEX K

SENSITIVITY TESTS

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Contents

1. Introduction

1.1 We have undertaken three sensitivity assessments of a range of interventions that are not included in the Recommended Strategy but could have a bearing upon future transport and land-use development if they were to take place at some future date. These are:

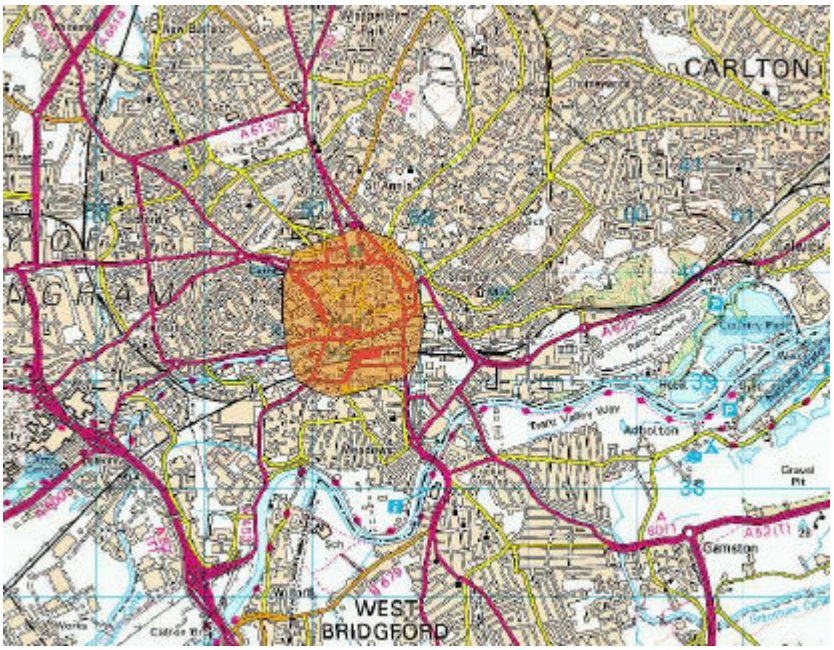
- Road User Charging in the Urban centre;
- Reduction in public transport fares in real terms; and
- An alternative land use scenario including +4000 extra allocation of housing.

1.2 For each of these three Sensitivity Tests, we have undertaken a full Model-run for 2016 AM Peak and compared the behavioural responses against those predicted for the Reference Case. The Tests are discussed in more detail below:

2. Road User Charging in Urban Area

2.1 As part of the appraisal of the recommended strategy, we have undertaken an assessment of the impacts of road user charging in Nottingham. The charging mechanism for this test assumes a cordon approach to charging. The cordon subject to charging is as shown in Figure 1.1 below.

Figure 1.1 – Cordon Charging Area



2.2 This area was chosen as it included the city centre, and also included a sufficient number of zones within the model to have a noticeable effect on traffic volumes in the area. It was felt that to model the effects of a cordon inside of Maid Marion Way would mean an insufficient area would be subject to a charge and thus no real effects would be shown.

2.3 In order to test this cordon charge, we have assumed a £5 charge. Thus, on every link entering or leaving the shown area on Figure 1.1, a £2.50 charge is applied. This £2.50 charge is applied as drivers would perceive a £2.50 charge on top of their morning journey cost and a £2.50 charge as part of their return journey cost. Similarly, a trip passing through the cordon area would see the full £5 charge applied.

2.4 This £5 charge has been converted into Generalised Cost units, and we also show the time equivalents, i.e. the perceived time equivalent to a £5 charge.

2.5 The values for the costs have been calculated in accordance with the Transport Economic Note (TEN), which provides the latest values of time and vehicle operating costs recommended by the Department of the Environment, Transport and Regions for use in economic appraisals of transport projects.

2.6 This conversion equates to the time equivalents as shown in Table 1.1 below.

Table 1.1 – Time Equivalents for a £2.50 Charge

Scenario	Minutes
Business Lights	5.9
Non – Business Lights	22.7
Commercial Vehicles	13.1

2.7 The impact of these charges on highway demand and time spent on network (vehicle hours) is summarised in Table 1.2.

Table 1.2 – Impact of Cordon Charge on Highway Demand

Scenario	Demand (No. of Vehicles)	% Change compared to Reference Case	Vehicle Hours (Flow x Time)	% Change compared to Reference Case
Reference Case	109,800	-	49,900	-
Recommended Strategy	109,100	-0.74%	48,400	-2.98%
Recommended Strategy with Cordon Charge	107,700	-2.00%	49,600	-0.57%

2.8 The impact of the charges has been to reduce overall model demand by around 1.3% across the network as a whole, when compared to the Recommended Strategy without cordon charging. However, there is a noticeable increase in vehicle hours across the network equating to 2.5% above the Recommended Strategy (without Cordon charging).

2.9 The effect of the charges on Mode shift is as follows:

- Public Transport Demand: Reference Case – 29,196
- Public Transport Demand: Recommended Strategy - 29,428
- Public Transport Demand – with Cordon Charge - 31,595

2.10 Thus, the impact of charging on mode choice is to increase public transport use by 2,167 passengers for the AM Peak in 2016. This corresponds to an increase of 8.4%. Conversely, this represents a 1.3% reduction in the number of highway trips.

2.11 The effects of the cordon charge are obviously more significant locally than for the network as a whole. We have assessed the changes in demand for trips into the area, and the level of re-assignment onto other routes in the area.

Table 1.3 – Change in Highway Demand into/out of City Centre – 2016 AM Peak

Scenario	Highway Demand No Cordon Charge	Highway Demand With Cordon Charge	% Difference
Destination City Centre	7,250	6,350	-12%
Origin City Centre	5,400	5,050	-7%
Total	12,700	11,400	10%

2.12 Table 1.3 shows that there is a 10% reduction of trips into/out of the city centre as a result of the cordon charge. This would also be a conservative estimate, as in this case additional suppression has not been applied.

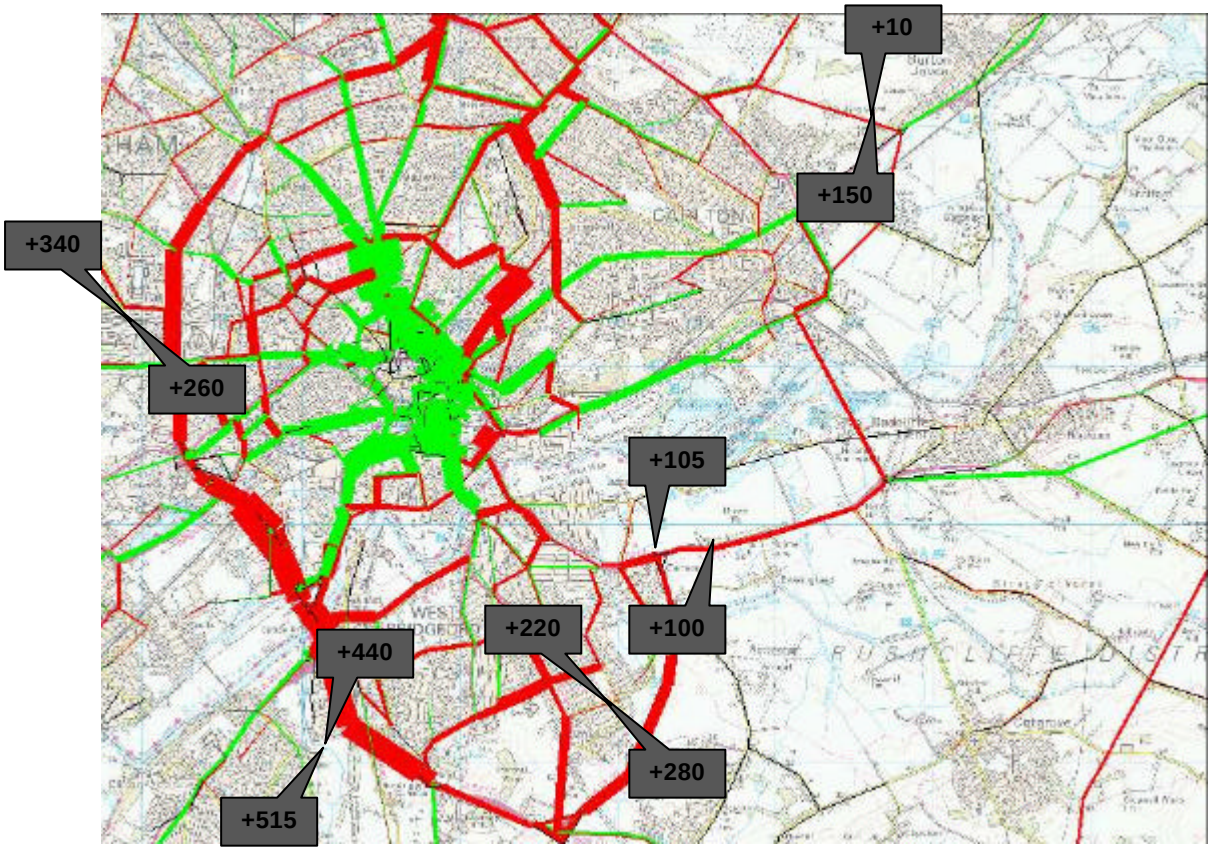
2.13 Table 1.4 shows the change in traffic volumes crossing the cordon. The Table shows that there is a significant decrease of traffic on every cordon link The total inbound flow is 58% less, and the outbound flow is 66% less.

2.14 There is clearly a high level of re-assignment to avoid the links subject to a charge leading to an increase of traffic on the Ring Road and other orbital routes outside of the charged area. Overall, all of the links inside the cordon in the city centre are relieved as can be seen from Figure 1.2, where traffic reductions are illustrated in green and traffic increase in red.

Table 1.4 – Traffic Volume Changes Crossing the Cordon – 2016 AM Peak

Scenario	Highway Demand No Cordon Charge	Highway Demand With Cordon Charge	% Difference
Inbound	15,700	6,500	-58%
Outbound	12,400	4,200	-66%
Total	28,100	10,700	-62%

Figure 1.2 – Traffic Volume Differences due to Cordon Charging



2.15 On the basis of the above test results, a cordon charge around Nottingham City Centre would result in a significant reduction in total traffic into the city, with a 8% increase in Public Transport use. The siting of the cordon would inevitably result in rerouting of highway trips onto other non-charged routes, particularly the Ring Road and other orbital routes in the area.

3. Reduction in Public Transport Fares

3.1 The second Sensitivity Test in the assessment of behavioural response to a significant reduction in public transport fares in real terms. We have assumed a 50% reduction in fares, and undertaken a full model run to ascertain the level of mode shift that this change would attain.

3.2 The results are summarised in Table 1.4 below. This table shows that a halving of public transport fares increases public transport use by nearly 750 people in the AM Peak in 2016. This constitutes a 2.5% increase in public transport use compared to the Recommended Strategy and 3.3% when compared to the Reference Case. This increase is entirely due to car drivers switching modes to public transport to take advantage of the reduced journey costs, therefore the halving of fares reduces car demand by 0.52%, or 570 vehicles in the morning peak.

3.3 This network wide reduction is focused clearly on areas with good public transport links, predominantly into Nottingham City Centre, therefore the reduction of traffic volumes in this area is shown to be around 1.5-2% in the A52 corridor, but up to 4% in other corridors, particularly the A60 Arnold.

Table 1.5 – Impact of Reduced PT Fares on Travel Demand

Scenario	Highway Demand (No. of Vehicles)	% Change compared to Reference Case	Public Transport Demand (Passengers)	% Change compared to Reference Case
Reference Case	109,800	-	29,196	-
Recommended Strategy	109,100	-0.7%	29,428	+0.8%
Recommended Strategy with Cordon Charge	108,600	-1.2%	30,162	+3.3%

3.4 An additional effect of reducing the Public Transport Fares by 50% would be to generate additional public transport users. This has not been undertaken for this study, but could be up to 15% additional trips with such a large fare reduction.

3.5 Clearly the switch from car to public transport is reasonably inelastic in that only a 1-4% reduction in traffic is forecast.

3.6 In summary, the impact of a 50% reduction in fares is to increase public transport use by 2.5% or 700 trips. This increase is form previous car drivers, although up to 15% additional trips may be generated. The fare change however is unlikely to change operating conditions on the highway network.

4. Alternative Land Use Scenario

4.1 In order to ensure that the fullest possible range of dwelling requirements, an additional land use scenario was modelled with an additional 4,000 dwellings over and above those already required. These were located in accordance with emerging Structure Plan policy, as in scenario 1, but with additional housing in Gedling (+1,000) and Rushcliffe (+3,000).

4.2 The additional requirement was assigned to those wards within Gedling (1,000) and Rushcliffe (3,000) only, considered to most closely meet this policy. We have created new matrices with these increases converted to additional trips and then re-assigned to create New Do Minimum, New Reference Case and New Recommended Strategy.

4.3 Table 1.6 summarises the main effects of the alternative land use scenario.

Table 1.6 – Impact of Alternative Land Use Scenario (+4000) on Travel Demand

Network Scenario	Highway Demand (No. of Vehicles) Scenario 1	% Change compared to Do Minimum Scenario 1	Highway Demand (No. of Vehicles) +4000 Houses	% Change compared to Do Minimum +4000 Houses
Do Minimum	110,700	-	111,700	-
Reference Case	109,800	-0.8%	110,900	-0.7%
Recommended Strategy	109,100	-1.5%	109,600	-1.9%

4.4 The alternative land use scenario adds approximately 1,300 new trips in the AM Peak hour, however these increases are subject to suppression and mode choice, hence the net increase over the proposed land use assumptions are around 600 to 1,000 trips.

4.5 The effect of the alternative land use scenario on Mode shift is as follows:

Table 1.7 – Impact of Alternative Land Use Scenario (+4000) on PT Demand

Network Scenario	Public Transport Demand (Passengers) Scenario 1	% Change compared to Do Minimum Scenario 1	Public Transport Demand (Passengers) +4000 Houses	% Change compared to Do Minimum +4000 Houses
Do Minimum	28,110	-	28,300	-
Reference Case	29,200	+3.9%	29,200	+3.2%
Recommended Strategy	29,400	+4.7%	29,700	+4.8%

4.6 Table 1.7 shows that the change in PT demand is similar between network scenarios given differing land use assumptions, but the additional housing scenario does result in an additional 250 PT trips in the Recommended Strategy.

4.7 In terms of changes to highway flows, the Alternative Land Use Scenario does not change traffic volumes by more than 40-50 vehicles on any major link, with the A52 and A612 traffic volumes changing by only 1-2%

4.8 Thus, the impact of an alternative land use scenario is to add around 1000 highway trips (2016 AM Peak). However, the use of suppression techniques and modal shift reduces this increase e to around 500 trips, and although focused on the Gedling/Rushcliffe areas does not change traffic volumes on any link to any significant effect. The Alternative Land Use Scenario does lead to around 250 more PT trips, which constitutes an increase of around 1%.