Annex C - Modelling analysis

1. Modelling of a number of access options has been made using the York Strategic Transport Model. Traffic models are constructed as computer representations that aim to reproduce the current behaviour of traffic on the highway network. A model that validates can be used to predict likely future traffic patterns. The York traffic model has recently (2010) undergone a major refresh including extensive roadside interview and public transport surveys to confirm and update its current validity. Modelling allows us to see where the model predicts traffic will go both on day 1 and where it will end up at when a steady state or equilibrium is achieved. Limitations to the model are that it does not explicitly model walking and cycling, and it also does not fully take into account any decisions not to make a trip or to change the time when a trip is made (peak spreading). Modal change arising from fundamental changes to public transport provision including quality of service and new routes are also not modelled. What we model is therefore a 'worst case' scenario. The model is used to indicate where issues might arise and for testing of mitigation options. A detailed local knowledge of the operation of York's highway network, traffic engineering practice and 'common sense' has also been used extensively in this analysis.

2. When a change is made to the highway network there is an initial impact as vehicles re-route from 'day 1'. Over the following days and weeks people explore different routes, different modes, and alternative times of day travel. Travellers may also decide to make trips to different locations or not to make some trips at all. After some time (weeks to months) the network achieves 'equilibrium', this is where it has settled down to the new patterns of travel. In reality this equilibrium is never fully stable because different people are travelling on different days and making different trips. Advance publicity of the restrictions and marketing of public transport, walking and cycling alternatives where appropriate, should help reduce the time taken for traffic to reassign and alternative mode choices adopted. The time taken to reach this equilibrium is important in that it dictates the appropriate length of the trial, in terms of understanding the effects, but note that this is separate from any legal restrictions over the time that an experimental order can be operated. Schemes reducing capacity generally settle down more quickly than those that increase capacity with the majority of rerouting occurring within the first few weeks of the changes.

3. An investigation into the elasticity of public transport demand i.e. how demand varies with cost and travel time shows that in York travel time is relatively inelastic. This means that relatively large savings in travel time for buses only result in small increases in bus patronage. A 10% reduction in bus travel times is resulting in a 2% increase in patronage. Improvements to reliability and frequency of services change the elasticity, making them more elastic. However, this is outside the scope of the model, although the local and national experience is that increasing the frequency of bus services is the biggest influence on patronage. This is important because savings in bus journey times bring about efficiencies in bus operations reducing the operating cost. These cost savings can then be passed on to the users through the fare structure, and/or increases in quality of the fleet and/or improvements in bus frequency. First have committed to reinvesting any efficiency gains back into York by improving the quality of the service – the running fleet, the stop provision and information about services, will all help increase patronage which in turn positively feeds back to the quality. However, quantifying the impact of quality improvements at this stage or through modelling is difficult.

4. Assessment of impact on air quality has not been made for the trial. The air quality will be measured during the trial using the existing network of monitoring points although air quality measurements need to be made over a long period before conclusions can be drawn. Assessment using air quality modelling would provide a good indication of the likely impact in advance of the on-street monitoring becoming available and would be necessary as part of considerations prior to any decisions on permanent restrictions being made.

Where does the traffic go?

5. On ‘day 1’ of the restriction the traffic splits between Water End and Skeldergate Bridges and to a lesser extent Ouse Bridge. At ‘equilibrium’ once the traffic patterns have settled down, the effect is far more dispersed with traffic redistributing to the A1237 and A64 river crossings. It should be noted that the changes in flow are not just the re-routed bridge vehicles but displaced vehicles as a consequence of re-routing. This ‘rippling out’ effect is very much as would be observed when throwing a pebble into a pond. What the model cannot tell us is how long it takes for the pattern to settle. From previous experience a change on the scale that we are talking

about it is likely to be in the order of weeks although the prior publicity about the scheme might make this more rapid.

6. Lendal Bridge carries approx 8% of river crossing vehicle traffic (excluding buses) in the morning peak. The table below shows the changes to the split of traffic on the other crossings that are predicted to result from a Lendal Bridge restriction:

River Crossing:	A1237	Clifton	Lendal	Ouse	Skeldergate	A64
Existing (total 12,400 veh per hr AM peak)	24%	9%	8%	6%	14%	38%
Lendal Br Restriction (total 12,200 veh per hr AM peak)	26%	11%	0%	7%	16%	40%

Notes: Different totals are due some vehicles crossing both bridges in the base situation. The Clifton Bridge figures are pre-reinstatement of left turn lane at Clifton Green.

7. Significant reductions in traffic volumes are predicted on the corridor from Queen Street (-290) past the station frontage (-400), Lendal Arch Gyratory (-600), Lendal Bridge (-700), Museum Street, St Leonards Place (-500) and Gillygate (-150).

8. Moderate reductions will take place on the Mount outbound (-140), Clarence Street (-90), Haxby Road inbound (-80). Some redistribution of traffic between Fulford Road, Cemetery Road and Heslington Road is indicated.

9. Significant increases in traffic are predicted on the Inner Ring Road anti-clockwise Prices Lane gyratory over Skeldergate Bridge, Fishergate and Foss Islands Road. The largest increase is at the Walmgate Bar (+200 northbound, +125 southbound). Increases in flow are also predicted for Water End at Clifton Bridge (+150 heading to Clifton Green, +200 coming from Clifton Green).

10. Area-wide the overall impact is low. The worst case increase in overall travel times over the entire city boundary is less than 2%. Looking at a cordon including the inner ring road and Water End this

raises to 3%. To put this into context traffic is expected to grow in York by 1% each year once the current economic recession ends.

11. The biggest impact is Water End eastbound and Foss Islands Road. In terms of the bus network these routes are less strategic. Lawrence Street and Layerthorpe Bridge Foss Bank and Foss Islands Road approaches are a concern but there are some options to re-route buses via James Street. In the longer term the completion of the James Street link road would provide relief for this corridor and may open up options for new routes and bus priority measures. Additional traffic on Water End would inevitably lead to additional traffic using residential roads in the Clifton Green area to avoid the signals at Clifton Green. The Rawcliffe P&R service route could be protected using signal settings and there is the potential for inbound bus lanes on Shipton Road.

12. The Burtonstone Lane and Crichton Avenue route would appear to provide an alternative means of accessing the Hospital and Nestle however the model does not show significant increases in traffic using these roads. Improvements to traffic conditions at Bootham / Gillygate are effectively countering against this. This route will require to be monitored as part of any trial.

13. Leeman Road would appear to provide an alternative route for traffic accessing the station from the north and although the model does not predict significant changes (<50 vehicles per hour) this would require monitoring.

14. A concern is that a number of the areas that are predicted to see increases in traffic volumes are within the Air Quality Management Areas and many are areas of technical breach (including Fishergate and Prices Lane). Equally other technical breach areas like Gillygate may see some improvement. However the Low Emission Strategy recognises that we can not simply eliminate vehicular traffic and that the focus needs to be on reducing emissions by encouraging the use of lower emission vehicles through the adoption of Low Emission Zones. Other strategies including freight consolidation, electric charging infrastructure, and the roll out of LSTF travel planning will all in time help encourage lower emissions from transport. In the short term it is likely that the overall effect is negative, in the longer term the effect would become positive.

15. Strategic management of where traffic re-routes using signal settings has the potential to be used to help protect strategic bus corridors or areas with air quality issues. Further work using the Paramics micro-simulation model that is being developed for the Low Emission Strategy would be required to help develop and assess these strategies. This work would be informed by the outcomes of the trial and would be undertaken before any implementation of any permanent restrictions.

16. One of the principal objectives of the scheme is to encourage people currently making private car trips to make more use of public transport. This can be achieved by improving the reliability, travel time and frequency of the buses. These reductions in vehicles on the road will help mitigate congestion on the highway network. Modelling work shows that the savings in travel times bus routes (and increases in car trip lengths) on only leads to a relatively small direct increase in bus patronage (+2%). However the modelling work does not take into account improved reliability of bus services, the potential for new routes being opened, the release of vehicles and drivers and subsequent reinvestment in improved frequencies. These have the potential to lead to a significantly greater impact. The option for cross-city park and ride routes is also opened up by the proposed restriction, and the feasibility of such routes can be tested as part of the trial.

17. Research findings (Cairns Atkins and Goodwin 2001) from an examination of over 70 case studies on road space reallocation concluded that problems with displaced traffic resulting from reallocation of road space were “in reality rarely as bad as predicted, and that, with careful planning and appropriate implementation, reallocating road space to more sustainable modes of transport can result in a variety of complementary benefits.” Traffic reductions evidenced in the report showed an average of reduction in traffic volumes of 11%. The month long closure of Lendal Bridge resulting in a 15.9% reduction in overall traffic volumes.