

Technical Note

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1 Introduction

- 1.1 In December 2006, MVA Consultancy submitted a report which presented our initial assessment of the feasibility of allowing a supermarket of 90,000ft² GFA to be built adjacent to the Manor Top gyratory. We recognised that the proposal for the supermarket was the key element of the regeneration strategy for the area but also that the gyratory forms the intersection between several busy arterial routes.
- 1.2 The study recognised the competing demands for capacity not just from the traffic approaching from different directions, but also from pedestrians, bus passengers and the Supertram that passes through the junction. Each of these different road users compete for a share of both roadspace and also time in the traffic signal plans.
- 1.3 Our report suggested that the proposed increases in traffic would be significant and would be likely to cause a redistribution of traffic over a broad area, including routes which are already subject to congestion. The creation of the supermarket itself would not be likely to lead to a high number of new trips being made, rather it was the changes in routing that concentrates the vehicles through this area of the network that lead to the congestion. Our analysis included potential mitigation measures including the provision of a Park and Ride site, retiming of the signals at the junction, partial reversion of the gyratory to two way traffic flow and traffic calming to prevent rat running.
- 1.4 Since our report has been submitted, the findings have been presented to The Head of Transport and Highways, The Head of Planning and The Director of Development Services of Sheffield City Council. We have also performed additional analysis for an option of a smaller supermarket and also for alternative rerouting scenarios. These still showed the impact of the proposed development would be significant local queuing and an increase in congestion across a wide area of Sheffield's road network.
- 1.5 This note provides a discussion of the infrastructure improvements that would be required to provide the local capacity to accommodate the existing trips and also any attracted trips to the supermarket, whilst maintaining the existing level of service for bus and Supertram. Whilst our proposed changes for the initial report did not directly reduce bus or tram priority (because both share roadspace with general traffic), increased queuing increases the time for public transport vehicles to reach the gyratory or, where dedicated lanes are provided approaching the gyratory, then the queues extended back beyond the start of these facilities.

2 Methodology

- 2.1 Our approach to this element of the study has been to take a very broad view of the issues related to the protection of the public transport network in the Manor Top area. We have not undertaken any additional runs using the highways assignment model as detailed in our previous report. Our approach has been to interrogate the output from the previous stages of the modelling to identify the likely limits of the queues and then to identify with the aid of site visits and aerial photographs the measures required to protect the PT network beyond the extent of the queuing.
- 2.2 We have undertaken this assessment purely with the objective of demonstrating what would be required to protect bus and Supertram services, and whilst we have sought to do this by proposing the most economically efficient interventions, we do not suggest that these improvements would be economically viable, either as part of a supermarket development, or for a wider more strategic objective. In addition we have not undertaken any detailed modelling of the impact of these proposals on public transport passenger demand.
- 2.3 Where additional carriageway width is required to provide an additional dedicated lane for the tram and / or Supertram we have not attempted to identify the landowners and these are likely in several cases to include private owners who may not wish to make that land available for the proposed improvements.

3 Required infrastructure

- 3.1 Although SCC are currently progressing a state of the art signal control for the gyratory, a positive outcome of the introduction is not guaranteed, and should the anticipated improvements of circa 5% capacity increase be realised that investment has been with the aim of *improving* the PT journey time and it would not be appropriate to utilise that increase for the purpose of providing a solution to a lack of capacity for a private development. We have therefore considered it appropriate to discount the SPRUCE programme for the purposes of our assessment. Similarly, we have undertaken an initial review of the gyratory and found no 'quick win' solutions to improve the capacity from revised staging or phasing at the junctions. This was not unexpected as the gyratory has been the subject of several studies from independent teams since Supertram was proposed. We therefore believe that the only effect that can be gained from revisions to the timings at the junction is to shift the balance of capacity from one arm to another. At present the balance is such that overall network capacity is achieved, although we recognise that it may be appropriate to skew the balance to relocate queues onto approaches where it is likely to be possible to provide more economic protection to the PT. However, this should be done in moderation or traffic will reroute to avoid these arms and potentially add to congestion in other areas of the network, to the detriment of bus and or tram operations on other routes.
- 3.2 Given the proposed use of the development at Manor Top as a supermarket then we recognise that the impact in the AM peak is going to be less than during the evening peak, although due to the existing levels of congestion on the route then even a small increase in demand would have significant impact on queues and therefore the delays to trams and buses if no mitigation were provided. Therefore although our previous report focussed on the PM peak then in this note we recognise the need for infrastructure improvements relevant to the AM peak too.

- 3.3 In the following paragraphs we consider the mitigation required for each approach in turn.

Ridgeway Road

- 3.4 Currently the Supertram runs on the offside of Ridgeway Road in both directions, although the southbound track is shared with general traffic. There are wide verges on both sides of Ridgeway Road with mature trees and these offer significant character to the route whilst also providing some barrier between the busy road and the residential properties that line the route. Running the buses in the tram lane northbound would offer protection from the queues, but prevents access to stops for passengers, and so would reduce the accessibility to public transport along the corridor. In order to protect the PT travel time and retain the accessibility then a bus lane running to the west of the existing nearside northbound lane would be required. In some places there would appear to be the roadspace to provide this, and this is the case north of the junction with Gleadless Road, which is the point where the lane would be required. However, beyond Hollinsend Road, in order to provide this lane it will be necessary to remove the trees and build the lane in the grass verge. In some places this will require additional enabling works, such as at pedestrian crossings. These measures would protect the buses and trams from any increased delays, but would do little to increase capacity for general traffic.

Mansfield Road

- 3.5 The current bus lane switches from being nearside to offside some distance from the main junction. This bus lane is currently poorly observed by vehicles and any enforcement would dramatically increase car queue lengths thus requiring an extension to the bus lane to prevent an increase in bus journey times. This could be avoided by creating a third lane of traffic approaching the junction by relocating the footpath into the proposed development site. The cost of this is likely to be high, due to both land purchase and cost of relocating statutory undertakers plant that may be in the footpath. This would however protect the bus services whilst not reducing the traffic capacity.

Prince of Wales Road

- 3.6 Prince of Wales Road does have a wide central reserve which may offer some capacity for providing the additional roadspace required for a bus lane (existing nearside lane would be converted into a bus lane an additional traffic lane created on the offside). However, the wide reserve currently facilitates turning movements via priority junctions that do not cause disruption to the main ahead flows. A reduction in the width of the reserve may require a rationalisation in the number of right turns available, and the inclusion of signal control for these movements.
- 3.7 Whilst this may provide some degree of protection to the PT movements locally, then this will not be adequate should the capacity of the junction not be increased. To facilitate that, then additional roadspace is required at the stop line. This could be achieved by using the wide footpath near to the school as a potential additional lane although some landtake from the playground may be required to retain adequate width of pedestrians (especially given the likely higher than average number of buggies at school arrival and departure times).
- 3.8 This doesn't however fully achieve the required capacity increase as the main movement is ahead and into Ridgeway Road, but the southbound Supertram line results in only two lanes being available away from the junction. To met the objectives of maintaining bus travel time

through the junction then a third lane of traffic would be needed through the 'contraflow' of the gyratory and this would need the tram tracks to be realigned one 'lane' further east. There would appear to be just enough space to achieve this without demolishing and building on the 'island', although retaining pedestrian access beside the tram may not be possible. The costs of realigning the tram will be considerable.

City Road

- 3.9 This approach to the gyratory has the least protection for trams and buses, with both using a single lane shared with traffic. In order to safeguard the PT travel time then it will be necessary to either significantly increase the capacity of all vehicles entering the gyratory, or to segregate PT and general traffic, the latter still risking adding congestion to other routes as a result of traffic diverting away from City Road.
- 3.10 The current provision is clearly a compromise solution between PT, general traffic and the needs of the frontage properties (residential and business). In order to meet the brief of this study, which is to provide the measures required to maintain the level of service to PT whilst providing for the development, it will require a significant change in the balance between these users away from the businesses and residents.
- 3.11 There are two options to secure the level of service, but both will be extremely expensive and unlikely to gain planning approval. Firstly, the parking areas could be removed and the tram lines relocated to be near side and shared with buses, leaving general traffic to queue in the outside lane (the nearside move would be required to allow bus passengers to board and alight).
- 3.12 The second option retains the tram lines where they are, but converts the parking to a general traffic lane and additionally provides a nearside bus lane. In order to achieve this, additional land would be required including 41 premises on the northern kerb (to Wulfric Road).
- 3.13 A third 'low' cost option would be to leave the tram in a tram only offside lane with buses and cars in the nearside. This would lead to a deterioration in the level of service for buses (some may share the tram lane as 'express' and not serve local stops), and would still lead the frontagers without kerbside parking for shoppers or visitors, although is possibly the only proposal that may be realistically achieved. It is however still likely to be damaging to local businesses and be met with opposition from residents.

4 Conclusions

- 4.1 Without a more detailed capacity assessment of the gyratory and the surrounding network it is not possible to absolutely state that the measures discussed would fully protect the bus and tram services, whilst offering the desired level of service for pedestrians and general road traffic. However, we believe that the above represents a package of measures that would be near to 'neutral' to public transport locally and within the slightly wider area, taking into account the likelihood of drivers to divert.
- 4.2 We would like to stress that these measures would be extremely expensive, need to be provided as a package and not individually, and in the cases of tram track relocation may require an Act of Parliament. Many of the additional areas of land identified for widening would appear not to

be in the control of the Highway Authority at the present time, and that would of course increase the timescale and costs of the works considerably.

5 Further Modelling

- 5.1 It is believed that a development of significantly smaller size may be considered by an operator if it was expected to be feasible from a transport perspective. We have already tested a scenario with 10% less trips generated by the development which, whilst showing a reduction in the rerouting of traffic away from the gyratory, still demonstrated a significant impact on traffic conditions both locally and over a wider area.
- 5.2 A development of 60,000ft² gross floor area has been suggested as the minimum floor area that an operator would be interested in. Whilst this would significantly reduce the number of trips generated by the development, it would not do so proportionally (ie by a third) as trip rates per unit floorspace for supermarkets tend to increase as the total floor space decreases. There would still be a significant generation of traffic by such a development and given the results of the test already performed on reduced traffic, we would strongly expect that such a development would still have a major impact on traffic conditions both locally and over a wider area.
- 5.3 Should further modelling be required, our standard rates would apply. However we believe that the modelling already funded by SCC has demonstrated that a development of any significant size will always have a dramatic impact on conditions for traffic in the area and further afield. Therefore it is our opinion that any further scenarios could be extrapolated from the work already done to date without the need for costly additional modelling. The next stage of modelling that would provide detailed effects of the development would form part of an Transport Assessment which a developer would be responsible for undertaking.