

Projects

4c Queens Road Modelling Study

o Purpose of Report

The purpose of this report is to present the findings of the modelling work to look at bus movements along the Queens Road Corridor between Anderson Drive and Groats Road, including the roundabout at Kings Gate and to test options to improve bus journey times.

o Background

Nestrans and partners in the Local Authority Bus Operators Forum (LABOF) commissioned Aecom in October 2016 to undertake a microsimulation modelling exercise of the B9119 Queens Road / Skene Road corridor with the main purpose to assess the current limitations of the network and identify potential solutions to improve bus journey times and reliability along the route, whilst also aiding pedestrian and cycling movements.

The work was commissioned to support ongoing discussions regarding the development of Statutory Quality Partnerships and identifying actions to improve the flow of buses on this corridor.

A model was created using VISSIM software following on-site surveys, site visits and other data collection to collect traffic, public transport, pedestrian and cycle data for the corridor. A detailed site investigation was undertaken and a full active travel audit carried out of the study area which extended from the junction at Anderson Drive to the junction with the Lang Stracht.

A map of the study area is provided in Appendix A.

The full study report is available on the Members only section of the Nestrans website and will be made public on approval.

o Key issues

A site investigation and surveys were carried out in order to understand the key issues and to build the base model. These observations highlighted that during the morning peak period, the majority of the queuing on this section of the corridor was observed to be on the westbound approach to the Kings Gate roundabout extending back to the Hill of Rubislaw traffic signals. The signals at the Provost Graham junction, just beyond the roundabout are also frequently activated during the AM peak often causing traffic to block back through the roundabout, exacerbating the problem. The queuing on the approach to Kings Gate impacts the operation of the roundabout as a whole and also causes significant delays and queues on Kings Gate itself and Springfield Road. Delays to buses and unpredictability of bus journey times have a significant impact on public transport users.

Similarly to the AM peak, the PM peak features extensive queuing in the westbound direction approaching the roundabout with some minor delays also observed in the eastbound approach to the roundabout.

One of the key issues for the corridor, noted by the bus operators during stakeholder consultation, was the variation in congestion and journey times from day to day and the unpredictability of the network.

o Objectives

In consultation with the client group, the study identified the following objectives:

- Improve journey times, reliability and punctuality for buses on the B9119 corridor;
- Support coherent, safe and attractive travel opportunities for all modes of transport on the B9119 corridor; and
- Deliver improvements on the B9119 corridor that support wider transport policies in Nestrans Regional Transport Strategy, the Aberdeen City Local Transport Strategy and the local/regional active travel action plans.

o Options

The following principal options were subsequently developed to mitigate the issues observed and were then tested on the model:

- **Option 1a** – Westbound bus lane on Queens Road between Viewfield Road and Kings Gate;
- **Option 1b** – As above but with a restriction on the right turn on Queens Road eastbound onto Hazledene Road, diverted onto Woodburn Avenue via Springfield Road;
- **Option 2** – Removal of the Kings Gate roundabout and replacement with a signalised crossroad. SCOOT/MOVA system implemented to link the Springfield Road, the new Kings Gate signals and Provost Graham Avenue junctions;
- **Option 3** – A combination of Option 1 and Option 2, a Westbound bus lane and signalised crossroads; and,
- **Option 4** – As Option 2, with an additional lane running eastbound exiting from the Kings Gate junction towards Springfield Road.

Following detailed testing, Option 1b, a westbound bus lane on Queens Road between Viewfield Road and the Kings Gate roundabout, together with a restriction on right turns eastbound onto Hazledene Road, emerged as the most favourable option, providing journey time savings for both buses and cars travelling westbound. The extent of the bus lane that was tested on the model is indicated in Figure 1 below. The benefits for buses of this option indicated savings of up to 3½ minutes in the AM peak period and up to 3 minutes in the PM peak, with a much improved consistency and less variability.

Nestrans also commissioned Aecom to undertake an initial topographical survey to better understand the dimensions of the road at this point, to ensure that there was sufficient width for the schemes being considered. Results indicate that the minimum road width between existing kerbs was found to be 10.61 metres, with an average width of around 11 metres. Footway widths vary between 2.0 metres and 3.35 metres minimums.

The SCOTS National Roads Development Guide (June 2017) suggests that the minimum carriageway width for a bus lane and two traffic lanes would be 9.0m width, but recommends $4.25\text{m} + (2 \times 3.0\text{m}) = 10.25\text{m}$. This would require an eastbound cycle lane to be accommodated on a shared use path on north side of Queen's Road, as there is insufficient width to maintain the eastbound on-road cycle lane.

It can therefore be concluded that there is sufficient carriageway width to accommodate a westbound bus lane between the Viewfield Road and the King's Gate Roundabout, subject to careful consideration and accommodation of cyclists' movements with specific provision required to replace the existing east-bound advisory cycle lane. The Queen's Road section between Viewfield Road and Rubislaw Road is the narrowest section of road and footways and may have the most challenges in terms of detailed design and approvals for a high quality westbound bus lane, whilst also accommodating cyclist movements and other vehicles.

Figure 1 - Extent of potential westbound bus lane contained within Option 1a and 1b



Other key findings from the option 1b model test are:

- One cause for delays in the eastbound section between Kings Gate and Springfield Road was due to right turning vehicles onto Hazledene Road from Queens Road. Due to reduced available road width in this section as a result of the westbound bus lane, any vehicle waiting to make the turning movement would effectively block any eastbound traffic until a suitable gap would appear. During free flowing conditions, gaps were unlikely to open up and as a result cause traffic to queue back from this location onto the roundabout. Option 1b therefore proposes that the right turn into Hazledene Road be restricted, and that vehicles would use Woodburn Avenue via Springfield Road. Some alternations would be required to the junction of Springfield Road and Woodburn Avenue to accommodate a right turn lane here.
- By removing the right turning traffic onto Hazledene Road, traffic on Queens Road rarely blocks back onto the roundabout.
- Other vehicles do still get caught behind alighting bus services however this is unavoidable given the reduced lane width and lack of space for a bus lay-by.
- Queues were reduced overall for Springfield Road.
- There are disbenefits for general traffic on Kings Gate which sees an increase in queueing, particularly in the AM peak.
- The average speed for all traffic on Queens Road decreased by 0.6mph in the AM peak but this is offset by an increase of 0.8mph in the PM peak.
- There is no improvement to pedestrian crossing facilities at the Kings Gate junction through retention of the roundabout and some dis-benefits to cyclists due to the need to remove the on-street cycle lane in order to create sufficient road width to accommodate the bus lane.

The results for the other model tests can be summarised as follows:

- Option 1b performs more favourably to Option 1a by reducing the blocking back of traffic through the roundabout.

- Option 2 – journey times reduce for westbound traffic by a good margin, outperforming the other options, but to the detriment of eastbound journey times which increase. The variability of bus journey times is also increased.
- Option 3 was the worst performing option and the network was unable to cope with the PM peak period demand.
- Option 4 – this option does not include a westbound bus lane and entails significant works to reconfigure the junction. This option copes well with the level of demand however, for public transport, it shows a very slight reduction in average speed during the AM peak. The addition of an extra lane running eastbound has a large impact on the performance of the signals with the section between Anderson Drive and Provost Graham Avenue seeing a much lower level of queuing across all time periods. This option performed well for all traffic but with less significant benefits for buses than option 1b and achieved at much greater cost than the cost of a bus lane.

A number of other minor tests were also completed on the network to identify any minor improvements that could be implemented to improve the overall network operation. These included:

- The **Provost Graham Avenue** signals were identified in the site visits as occasionally causing traffic to block back onto the Kings Gate roundabout. In one sub-test on the base model, the phase for exiting traffic from Provost Graham Avenue was removed, effectively transforming the junction into entry only while retaining the pedestrian crossing due to the nearby primary school. Traffic was re-routed via Provost Graham Avenue, creating a one way system, with traffic exiting near the Hazlehead bus terminus. It was found from this test that delays still occurred in the westbound direction, suggesting that the benefit of implementing this was minimal and confirms that the cause of the delay was the Kings Gate roundabout being at capacity, rather than the signals at Provost Graham Avenue.
- Installing a traffic island at the **Springfield Road junction** would provide some benefit to both pedestrians and general traffic on the network. At present, there is a large >30 metre pedestrian crossing which means a long green time for the pedestrian phase of over 15 seconds being required. Installing a traffic island in the centre would allow a form of refuge, while opening opportunities to revise the signal plan to reduce the pedestrian phase.
- A similar traffic island could be installed at **Groats Road junction** to create a similar effect as, at present some delays occur to the network especially during the morning peak as a result of the Groats road signals being activated frequently. A pedestrian island may allow opportunities to modify the signal phasing and reduce delays. There are however questions over whether this would be to the detriment of pedestrian movements.

The Local Authority and Bus Operator Forum have considered the findings of this study and have developed a package of measures to be put forward to Aberdeen City Council for more detailed consideration as Roads Authority.

This potential package of measures has been informed by the model tests and the active travel and bus stop infrastructure audits that were carried out as part of the study.

o **Potential package of measures for further consideration**

1. Provision of a westbound bus lane on Queens Road extending between Viewfield Road and the Kings Gate roundabout with a restriction on right turns eastbound onto Hazledene Road.
2. Installation of bus lane camera enforcement facilities to support the introduction of a new bus lane.
3. Consideration of whether a shared use pedestrian and cycle path can be created eastbound from Kings Gate roundabout to Viewfield Road to replace the current on-street cycle lane. This would also provide the benefit of continued cycle provision eastbound through the Springfield Road junction.
4. Consideration of pedestrian islands at the Springfield and Groats Road junctions.
5. Improvements to provision and safety for active travel modes at the Kings Gate roundabout;
6. Review the findings of the active travel audit and identify opportunities to improve the provision, layout and location of tactile paving and push button units at pedestrian crossings.
7. Review the findings of the active travel audit and identify opportunities to improve the path network and gaps in infrastructure to key trip attractors.
8. Review the findings of the public transport infrastructure audit and identify opportunities to improve bus infrastructure provision along the corridor e.g. improvements to bus shelters, lighting and information.

o **Statutory Quality Partnership**

The Queens Road corridor extending from Aberdeen to Westhill has been identified as a future Statutory Quality Partnership corridor and this is being progressed through the LABOF partnership. This study was taken forward to examine in more detail one small section of the corridor that was identified as causing particular problems for buses and general traffic.

The findings and recommendations emerging from this study will be used to inform a wider package of measures to improve bus provision on this corridor as a whole and form part of a future SQP.

o **Recommendations**

The Board is recommended to:

1. Note the findings of the modelling study; and
2. Refer the findings to Aberdeen City Council for further consideration as roads authority.

KC/RD 14 September 2017

